INTERAVIA

REVIEW OF WORLD AVIATION

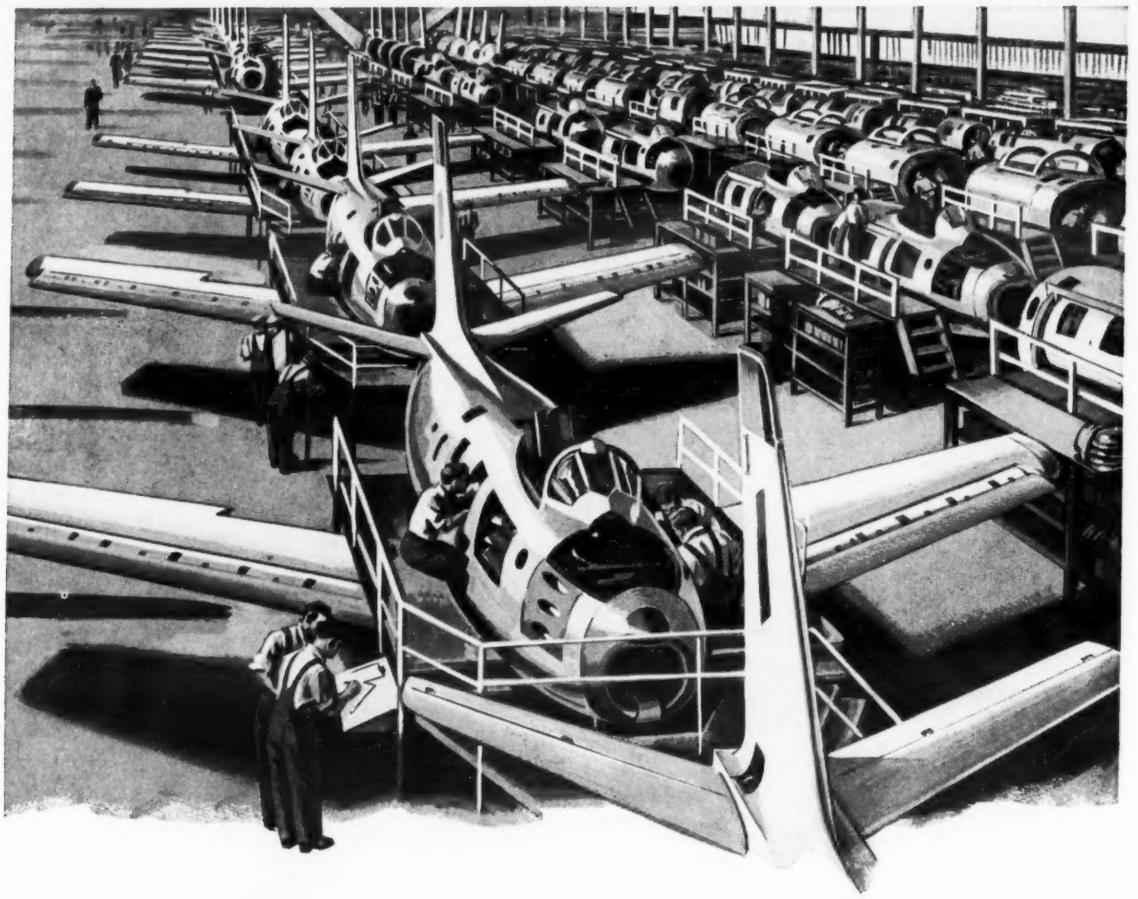
Price of this issue

U. S. A.:	80 cents
British Isles:	5 s
Switzerland:	Fr. 2.80
Netherlands:	Fl. 2.80
Denmark:	d. Kr. 5.—
Germany:	DM 2.75
France:	Fr. 250
Italy:	Lire 410

IN THIS ISSUE

Air Transport 1953

VOLUME VIII **10** 1953



Production COUNTS— AT CANADAIR

Fifty Years of
POWERED FLIGHT...

But 16 years after the age of powered flight was ushered into the world, two intrepid Englishmen taxied down a rough air strip at St. Johns, Newfoundland.

16 hours and 12 minutes later these pioneers of the skies set their craft down at Clifden, Galway, Ireland. Capt. John Alcock and Lieut. Arthur Brown, the heroes of this 1,890-mile flight, were the first to fly non-stop between the new and the old world.

This first transatlantic flight opened up a new era. Today, the vast strides made in the field of aviation are dramatically expressed in the jet powered aircraft that now make the same flight safely in a fraction of the time.

At Canadair the first consideration is production: getting things done — that's Canadair.

At Canadair one quickly senses the steady tempo . . . the vigorous production flow . . . the sense of responsibility among the Canadair people and their pride of accomplishment in the finished product.

Yes, production counts at Canadair: counts in every aspect of manufacturing — in purchasing . . . engineering . . . tooling and planning — as Canadair builds lasting quality into the planes she makes.

For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W.1., England.

CANADAIR
LIMITED, MONTREAL, CANADA

INTERAVIA

Review of World Aviation

Volume VIII — No 10 — 1953

Editor: E. E. Heiman
Executive Editors: P. A. Blackburn, E. Herzfeld, H. Rieck
Associate Editors: J. M. Stroud, J. Jenni, E. Baur, H. Lapierre, A. Arbex, Ginés de Bracamonte
Art Editor: K. Keller
Circulation: W. Meisel

Contents

AIR TRANSPORT 1953

Prologue to I.A.T.A.'s Ninth Annual General Meeting 563
International Air Transport — Prospect and Retrospect W. P. HILDRED, MONTREAL 565
I.A.T.A.'s Big "At Home" 568
I.A.T.A. and the Journalists CASSIOPEIA, LONDON 570
Pillars of World Air Transport 571
I.A.T.A.'s Canadian Hosts
I — Trans Canada Air Lines 575
II — Canadian Pacific Air Lines 578
A.I.C.M.A. G. HEREIL, PARIS 580
Switzerland's International Airports 582
A Buckshee Ride G. FÉVRIER, PARIS 584
The Boeing B-52 eight-jet bomber 585
AISA I-115 — A Spanish Trainer 586
Twenty Years Ago 588
Book Reviews 590
The Convair Sea Dart 591
What's in the Air? 592
Report on U.S. Air Power CHRIS ROBERTS, WASHINGTON 594
First Impressions of Farnborough 595
Collins' Integrated Flight System F. BAUMGARTNER, ZURICH 602
The Mind of Mr. Reader 604

Front Cover:

One of the latest big American transport aircraft is the Wright turbo-compound-engined Douglas DC-7. American Airlines propose to begin operating the type next month.

Appears Monthly in Four Editions: English, French, Spanish and German.

Advertising Department, Publishing and Editorial Offices, Subscription Department: Interavia S. A., 6, Corraterie, Geneva. Telephone: 5 42 34 (five lines). Cables and Telegrams: Interavia-Geneva. Teleprinter: 2 21 22. Postal Cheque Account: Geneva I 5380.

Annual Subscriptions: Switzerland, Sw. frs. 28.00; U. S. A. and Canada, $ 7.00; Great Britain, £2 6s Od; France, Fr. frs. 2,400; Belgium, Belg. frs. 360.00; Holland, Fl. 28.00 Germany, DM 27.50; Sweden, Kr. 35.00; Norway, Kr. 50.00; Spain, Ptas 275.00; Austria, ö. S. 180; Brazil, 230 Cr$; Uruguay, 23 pesos. All other countries: Sw. frs. 28.00.

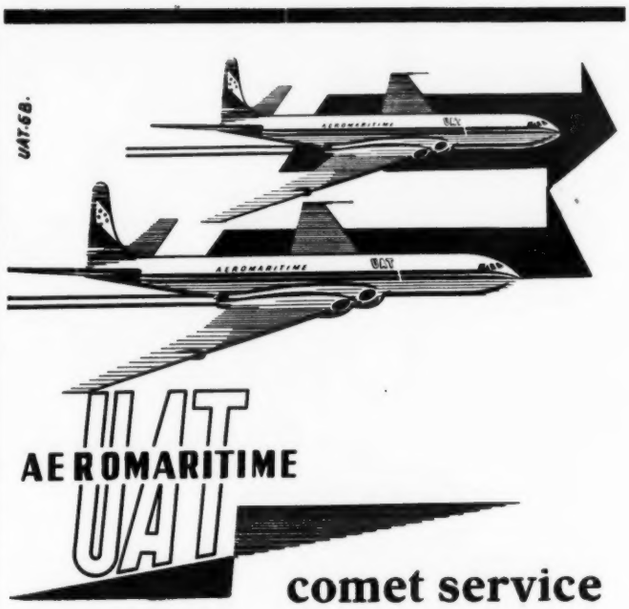
Agents and Distributing Offices:

INTERAVIA AUSTRIA:	Morawa & Co., Wollzeile 11, Vienna I.
INTERAVIA BELGIUM:	Office de Publicité, 16, Rue Marcq, Brussels.
INTERAVIA BRAZIL:	R. F. Besnard, 91 av. Almirante Barroso, S. 417-419, Rio de Janeiro. 131, rua Marconi 5e And., Sao Paulo.
INTERAVIA CANADA:	Wm. Dawson Subscription Service Ltd., 587 Mount Pleasant Road, Toronto 12, Ontario.
INTERAVIA DENMARK:	Dansk Centralagentur, Stormgade 20, Copenhagen.
INTERAVIA FINLAND:	Akateeminen Kirjakauppa, Keskuskatu 2, Helsinki - Rautatiekirjakauppa Oy, Köydenpunojank 2, Helsinki.
INTERAVIA FRANCE:	144, Champs-Elysées, Paris VIIIe.
INTERAVIA GERMANY:	Interavia GmbH., Lohausen Airport, Düsseldorf. Subscriptions and single copies: Ausland-Zeitungshandel W.E. Saarbach, Gereonstrasse 25-29, Cologne 1. Postal Cheque Account Cologne 25823.
INTERAVIA GREAT BRITAIN:	Interavia (United Kingdom) Ltd., 2-5, Old Bond Street, London, W. 1.
INTERAVIA HOLLAND:	Rotterdamsche Couranten-Import en Kioskenonderneming v/h van Ditmar, Postbus 262, Rotterdam.
INTERAVIA IRELAND:	Basil Clancy, Esq., Cooleevin, Foxrock, Co. Dublin.
INTERAVIA HUNGARY	Kultura, Akademia-utca, 10, Budapest, V.
INTERAVIA ISRAEL:	F. Pinczower P.O.B. 6008, Tel-Aviv.
INTERAVIA ITALY:	30 Via San Marino, Rome.
INTERAVIA NORWAY:	Narvesens Kioskkompani A.S., Box 125, Oslo.
INTERAVIA SOUTH AFRICA:	P. O. Box 6073, Johannesburg.
INTERAVIA SPAIN:	Donoso Cortés 85, Madrid.
INTERAVIA SWEDEN:	Postbox 29, Linköping.
INTERAVIA URUGUAY:	R. F. Besnard, Edificio Artigas, Rincôn 487, Montevideo.
INTERAVIA U.S.A.:	385 Fifth Avenue, Room 1408, New York 16, N.Y. Subscriptions also from the International News Co., 131 Varick Street, New York, N.Y.

Copyright 1953 by Interavia S. A., Geneva, Switzerland

Printed in Switzerland

Imprimeries Populaires, Geneva — Héliographia S. A., Lausanne
Imprimerie de "La Tribune de Genève", Geneva



MEMBER OF I.A.T.A.

our services

Comet service

60,000 miles of regular services per week on our routes serve the French Union and offer you rest, relaxation and time-saving.

Aerobus service

Local services operated by four-engined Herons enable you to reach your destination with the minimum of expense, the maximum of comfort and without delay by providing connections with the main lines.

DC-4 service

Our DC-4 Skymaster services provide regular tourist class connections where our principal concern is your comfort and the greatest possible convenience in time-tables.

Freight service

Our service offers you three ways of sending your freight :

1. Express delivery via COMET SERVICE providing the quickest possible handling of perishable goods.

2. FREIGHT via DC-4 SKYMASTER CARGO SERVICE giving maximum economy of handling and packing as well as fastest delivery.

3. FREIGHT SERVICE, ship/aircraft, for your heavy goods providing deliveries to distant coastal ports under most favourable time and cost conditions.

INFORMATION :
ALL APPROVED AGENCIES

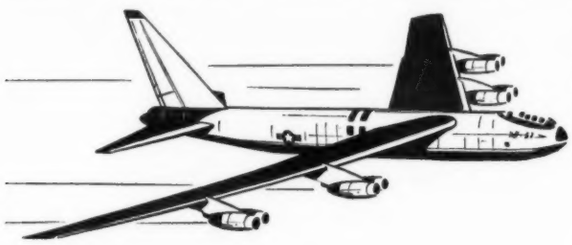
AEROMARITIME ★ *U.A.T.* ★
19, BOULEVARD MALESHERBES, PARIS Anj. 78-04

United Airgram

UNITED AIRCRAFT EXPORT CORPORATION

J-57 TURBOJETS IMPRESSIVE IN PERFORMANCE

Pratt & Whitney Aircraft's big J-57 turbojet is rapidly proving to be one of the finest turbojet engines yet developed, according to a report from the Boeing Airplane Company. The report was made at the conclusion of a full year of flight testing two Boeing B-52 Stratofortress bombers, each of which is powered by eight J-57 engines. The B-52 was the first airplane to use J-57s as prime power plants. The engines are mounted in four double-pod units, attached under and forward of the swept wings.



The engine was described as the best new power plant the company has had in any experimental airplane, and the engine's quick rate of acceleration was noted as an outstanding feature. The engine can reach full power in a matter of seconds.

Meanwhile in California, North American Aviation Company's J-57-powered F-100 jet fighter has completed first flight tests. Designed to fly at speeds greater than the speed of sound, the new swept-wing U. S. Air Force fighter is to be a successor to the famed F-86 Sabre, which achieved a 13 to 1 victory ratio over Russian-made Mig-15s in Korean air combat. During the first week of tests, the Super Sabre was flown eight times. It is reported to have exceeded performance requirements.

North American delivered the Super Sabre to the test flight base one month ahead of schedule.

HUGE PROPELLER DEVELOPED FOR TURBOPROP ENGINES

A huge, new propeller, designed especially to absorb efficiently the great power output of new turboprop engines, has been developed by Hamilton Standard Division. Heart of the propeller is the blade itself which is almost eight feet long from hub to tip, and two feet wide. It is the widest propeller blade ever developed. Hamilton Standard used the same rugged hollow steel construction for the new blade as that which it developed for the hydromatic propellers now used on many of the modern airline transports. The blade airfoil is a thin, hollow steel shell fitted over a hollow steel core. Air spaces within the shell are filled with a vulcanized synthetic material which, with the hollow construction, gives the blade great strength without excessive weight.

Three of the big blades are used on Hamilton Standard's new A-3470 propeller. This propeller is fully reversible, featuring hydromatic controls similar in principle to those used for piston engine propellers flown on most airline transports. By varying the size and number of blades, this propeller can be adapted for engines of over 9,000 horsepower and speeds of more than 500 miles per hour.

BELGIAN SABENA AIRLINES OPENS NEW HELICOPTER SERVICE WITH SIKORSKY S-55s

Belgian Sabena Airlines, which operates air services ranging from trans-Atlantic flights to schedules serving all of Europe, the Near East, and Africa, is establishing its inaugural routes for regular helicopter passenger flights, the world's first on international schedules. A fleet of big Sikorsky S-55 helicopters, each carrying seven passengers in addition to the crews, will be used for the service.

Service begins with three routes out of Brussels. The first is to Bonn, Germany, 131 miles, with intermediate stops at Liege and Cologne. A 60-mile non-stop service flies to Lille in northwest France. The third service covers the 73-mile distance between Brussels and Rotterdam, with an intermediate halt at Antwerp.

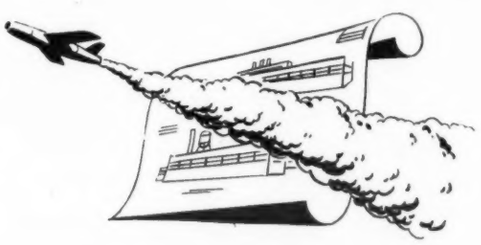
Sabena pioneered helicopter operations in western Europe, beginning airmail flights in 1950.

Meanwhile, in the United States, New York Airways has started carrying passengers in helicopters, also Sikorsky S-55s, between the three large airports in the New York City metropolitan area. Airline passengers from Europe arriving at New York International airport may now fly to LaGuardia or Newark airports for connecting flights to other parts of the United States. Helicopter rates are about the same as taxicab fares.

CHANCE VOUGHT BUILDS FACILITY FOR GUIDED MISSILE PRODUCTION

Production models of Chance Vought Aircraft's new Regulus guided missile will be completed, checked and tested in a large hangar building now under construction in Dallas, Texas. The new structure, costing an estimated $1,300,000, adjoins the present Chance Vought aircraft factory. Completion is expected early next year.

Regulus is a surface-to-surface missile. Its design and development for the U.S. Navy began in 1947, and first flight was in 1950. Production began recently.



Missiles leaving the production line in the main factory will go to the new hangar for final installation of internal components and systems. Complete flight simulation -- the equivalent of actual flight -- will test missile operation through engine starting, takeoff, climb, cruise and let-down maneuvers.

Among new development work at Chance Vought is the design, under Navy contract, of a new day fighter airplane. The division builds the twin-jet F7U-3 Cutlass fighter, and recently started production of the A2U-1, an attack version of the Cutlass.

UNITED AIRCRAFT EXPORT CORPORATION . . . . . EAST HARTFORD 8, CONN., U.S.A.
European Offices 3/5 Warwick House Street, London SW1, England

Thanks to their 30 years' research in high-frequency problems, Compagnie Générale de TSF and Société Française Radioélectrique can now produce high-quality radar equipment for all uses.

Then there is the CSF Type ASV 23 instrument landing equipment, which works on 1200 mc/s, the SFR radio navigation instruments (radio altimeters, VHF D/F equipment for aircraft, airports, etc.) and a whole range of radio communications equipment.

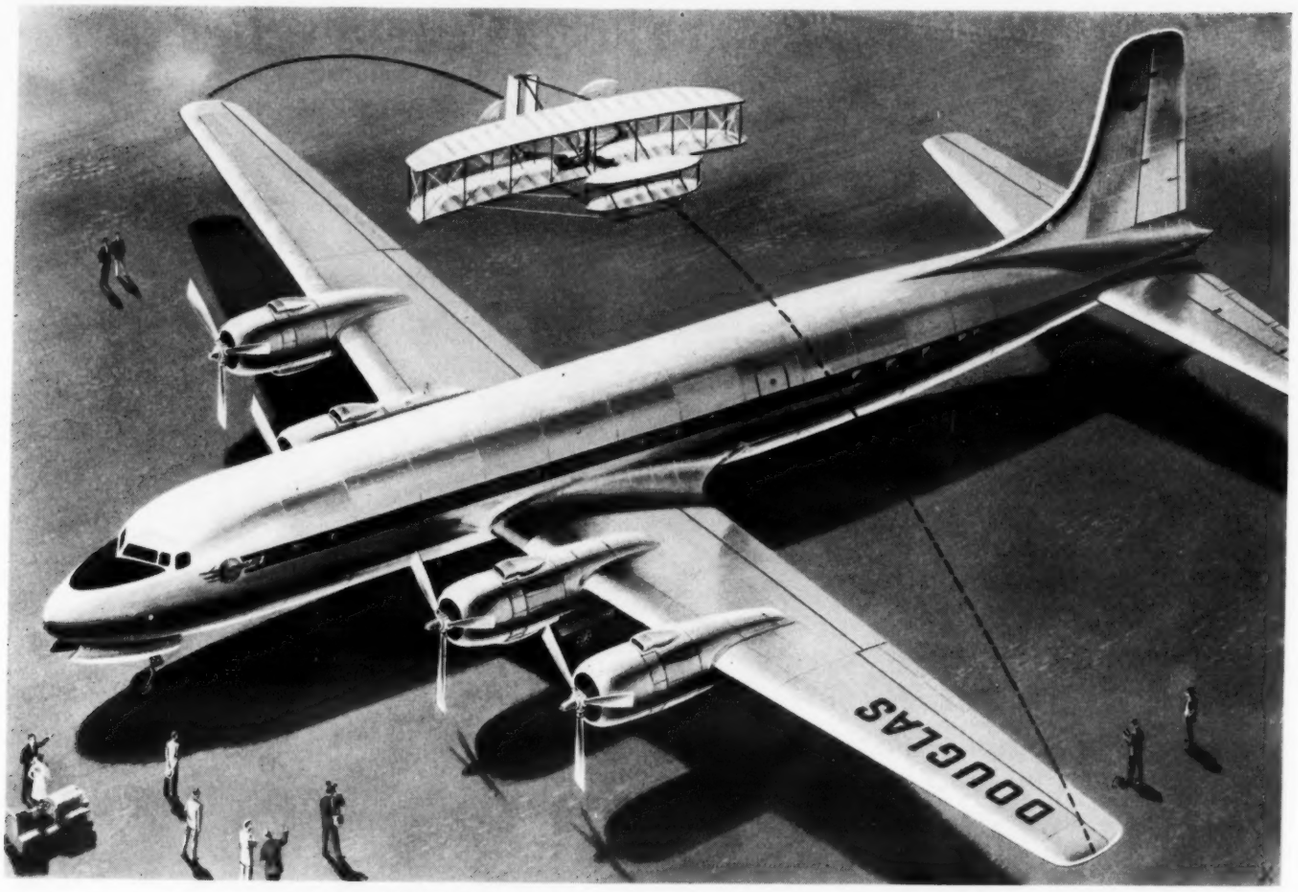
CSF and SFR instruments, developed and tested in large specialized electronic research laboratories, are widely used by civil and military authorities, both in France and abroad.

COMPAGNIE GÉNÉRALE DE TÉLÉGRAPHIE SANS FIL
SOCIÉTÉ FRANÇAISE RADIOÉLECTRIQUE

79, BOULEVARD HAUSSMANN • PARIS-8E • TÉL. ANJ. 84-60

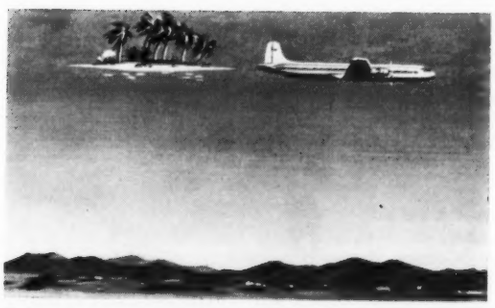
PUBL. RAPY

What's doing at Douglas — *WORLD'S LARGEST BUILDER OF AIRCRAFT*



"DC" MEANS DOUGLAS... builder of the famous DC-3 and DC-4... the big, modern DC-6 and DC-6B... the new DC-7. Next time, go by air ! Ask for reservations on a dependable *Douglas*

Its wings are as long as the Wrights' first flight !



Takes the sea level up two miles ! The Douglas DC-6 and DC-6B are altitude-conditioned to give you sea-level comfort 12,000 feet up. In fact, these huge airliners are built to fly almost five miles high... where the air is sunny and smooth

Fifty years ago, the Wright brothers made the world's first powered airplane flight. Their plane flew 120 feet—just inches more than the wingspread of today's giant Douglas DC-6B. The Wrights' speed : about 30 m.p.h.—the DC-6B's : 315 m.p.h.

"Queen of the Fleet" on these leading airlines of the world is the giant, modern Douglas DC-6 or DC-6B :

AA *Argentine* - ***ALITALIA** *Italian* - **AMERICAN** *U. S.*
BCPA *Australian-New Zealand* - **BRANIFF** *U. S.* - **CMA** *Mexican*
CONTINENTAL *U. S.* - **CPAL** *Canadian* - **DELTA-C&S** *U. S.*
FLYING TIGER *U. S.* - **JAL** *Japanese* - **KLM** *Netherlands* - **LAI** *Italian*
***LAN** *Chilean* - **NATIONAL** *U. S.* - ***NORTH AMERICAN** *U. S.* - **PAL** *Philippine*
PANAGRA *U. S.* - **PAN AMERICAN** *U. S.* - **SABENA** *Belgian*
SAS *Danish-Norwegian-Swedish* - **SLICK** *U. S.* - **SWISSAIR** *Swiss* - **TAI** *French*
UNITED *U. S.* - **WESTERN** *U. S.* * *Soon*

Twice as many people fly **DOUGLAS** as all other airplanes combined

- *less opening shock*
- *less oscillation*
- *less side drift*
- *jumper descends straight down landing on his feet*

The NEW DESIGN makes the difference

P7-B*
P9-B*

PIONEER Guide Surface Personnel Parachutes

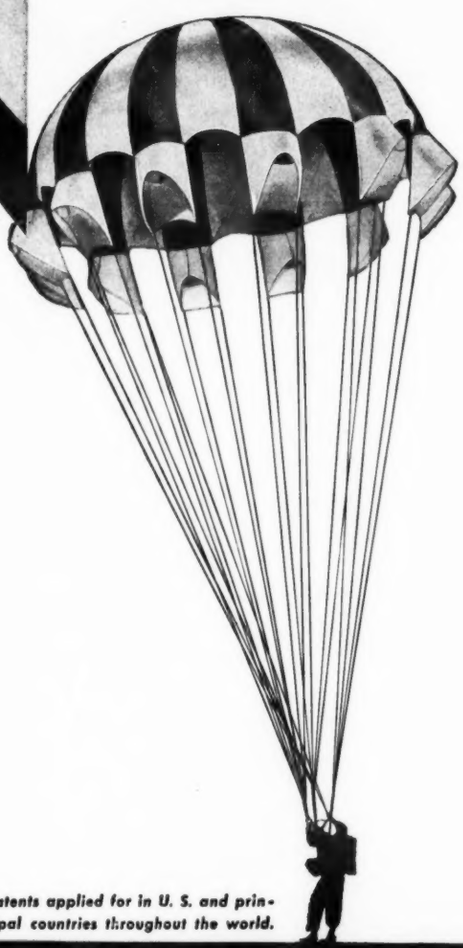
acclaimed

by the world of aviation

Recognition of the Pioneer Parachute Company's newest contribution to safer, surer recoveries from emergencies at today's higher aircraft speeds, has been quick and widespread.

Only the unequalled development, engineering and manufacturing facilities of Pioneer can combine to put the unique characteristics of the new Guide Surface Personnel Parachute — specifically designed for modern high speeds — at the service of the entire aviation industry.

Write today for the new booklet, giving the full story of the P7-B* and P9-B* Guide Surface Personnel Parachute, standard equipment of the U. S. Air Forces, and made available now, by the Pioneer Parachute Company, to other governments and commercial flyers.



**Patents applied for in U. S. and principal countries throughout the world.*

PIONEER PARACHUTE COMPANY, INC.
MANCHESTER, CONNECTICUT, U. S. A.
CABLE ADDRESS: PIPAR, Manchester, Conn., U. S. A.

Holland & Denmark : Schreiner & Company, 24 Javastraat, Den Haag, Holland.
Switzerland : RIWOSA S.A., Witikonerstrasse 80, Zurich 32, Switzerland.
Turkey : M. Affan Ataceri, 69 Adakale Sokak, Yenisehir, Ankara, Turkey.
Belgium : Benelair, Ltd., Rue Royale 43, Brussels, Belgium.
Sweden & Finland : Mr. Ake Forsmark, Kummelvagen 9, Alsten, Stockholm, Sweden.
Norway : Wideroe's Flyveselskat A. S., Kr. Augustsgt. 19, Oslo, Norway.
France : Mr. Guy Robert, Equipements d'Avions et d'Aérodromes, 11 Rue Tronchet, Paris 8, France.

ZURICH INTERCONTINENTAL AIRPORT

HOMEBASE OF SWISS AIR LINES

Served by :

Air France
France

British European Airways (B.E.A.)
England

British Overseas
Airways Corporation (B.O.A.C.)
England

Israel National Airlines (EL-AL)
Israel

Koninklijke
Luchtvaart Maatschappij (K.L.M.)
Holland

Linee Aeree Italiane S.A. (L.A.I.)
Italy

Panair do Brasil
Brazil

Philippine Air Lines (P.A.L.)
Philippines

S.A. Belge d'Exploitation de la
Navigation Aérienne (SABENA)
Belgium

Scandinavian Airlines System (S.A.S.)
Sweden, Norway, Denmark

Trans World Airlines (T.W.A.)
United States of America

Yugoslovenski Aero-Transport (J.A.T.)
Yugoslavia

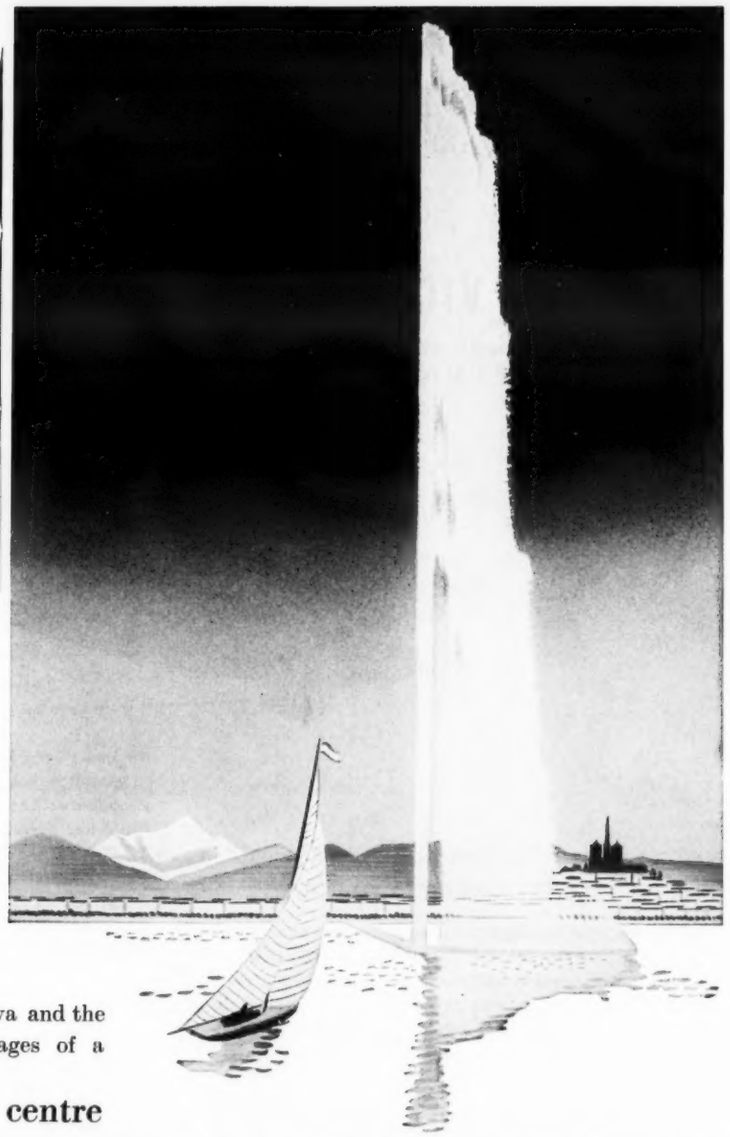
SNCAN
NORD 2501

20 RUE VERNIER PARIS 17e GAL 94-52

- *Zermatt*
- *Crans s/Sierre*
- *Verbier*
- *Champéry*

- *Bernese Oberland*
- *La Gruyère*
- *Château-d'Œx*
- *Villars*
- *Caux*
- *Montreux*
- *Vevey*
- *Lausanne-Ouchy*
- *St-Cergue s/Nyon*

- *Aix-les-Bains*
- *Annecy*
- *Megève*
- *Chamonix*
- *Evian*
- *Divonne-les-Bains*



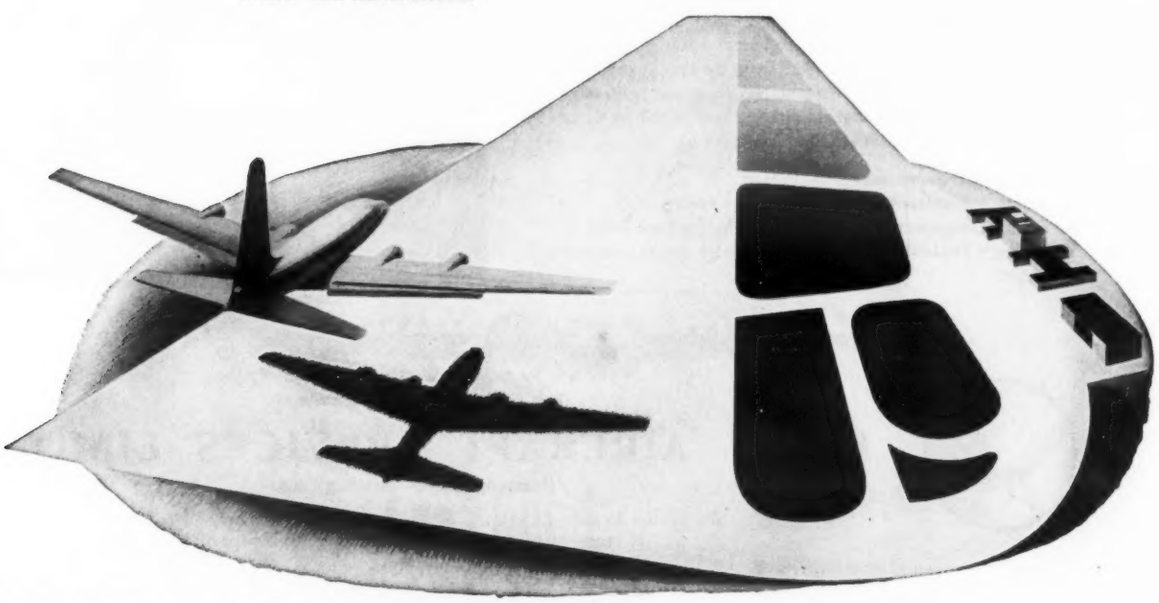
W. MAURER

GENEVA

gateway to French Switzerland, Lake Geneva and the Mont Blanc district, offers all the advantages of a

tourist centre

with its lake, its parks, its summer university courses, its international meetings, events and institutions.



INTERCONTINENTAL AIRPORT

Faster — bigger payload — and converted for you

VERSATILE VICKERS VIKINGS

— MAINTAINED BY BRITISH EUROPEAN AIRWAYS AND READY FOR YOU TO TAKE OVER NOW

BEA PHOTO

ONE OF THE GREATEST AIRCRAFT OF ALL TIME

Whether you want one aircraft or a fleet, you would be well advised to inspect these fine Vikings. The Vickers Viking Mark IB long-nosed metal-winged aircraft has, after proving itself in practically every sort of flying condition to be found anywhere in the world, gained a second-to-none reputation for absolute reliability and fine performance. (In Gt. Britain Viking aircraft form the Queen's Flight.)

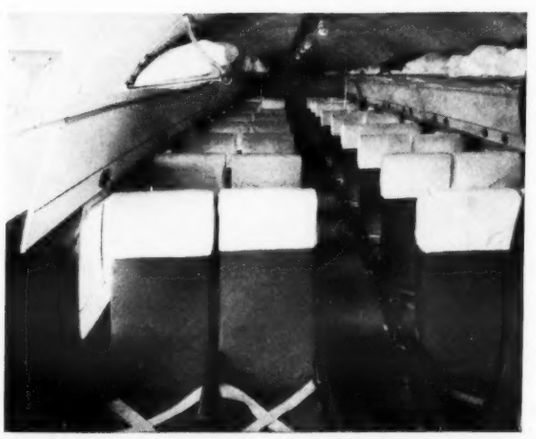
TELL US HOW MANY YOU WANT AND WHAT YOU WANT THEM FOR, and we will convert them to suit your particular need.

In offering these fine aircraft for sale we also undertake to provide all the necessary spares, tools and ground equipment. You can order any number and take delivery of the aircraft as they are now fitted: — to carry 27 passengers, two pilots and radio officer (equipped with galley for in-flight catering and toilets), or we can undertake to convert them as follows: —

a) **Viking "Troopmaster"** — 36 seats.
b) **Viking "Mayfair"** — 36 passengers in luxury.
c) **Viking Freighters** — Large door and freight floor fitted.
d) **Viking "Executive"** — Luxury conversion similar to Queen's Flight.

MAIN FEATURES

Engines: Twin Bristol Hercules 634 fitted with all modifications to latest Bristol Aeroplane Co. standard.
Propellers: Rotol R44/456/4. Hydraulic, 4-bladed, metal.
Electrical System: 24 volt D.C. Generators, Type 02,30 volt, 3,000 watts.
Radio: MF/HF. WT. T.1154/5, V.H.F. STR 12A 23 Channel, S.C.R. 269G. A.D.F. Equipment, A.R.I. 5083. Gee/Mark 2, I.L.S., M.F.R. 24, B.C. 3611, B.C. 357 (Fan Marker), C.B.A.



Write now for full specifications and details of prices.
This remarkable offer is exclusive to :

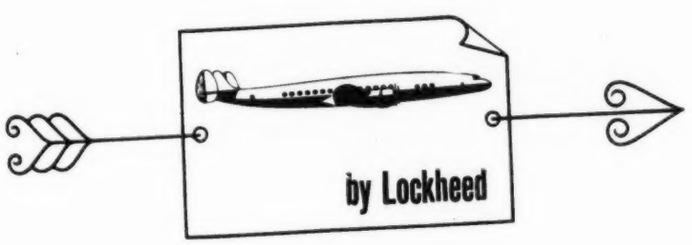
EAGLE AIRCRAFT SERVICES LIMITED

(Formerly Aviation Servicing Ltd.)

Blackbushe Airport, Camberley, Surrey. Telephone: Yately 3242, 3264.
29 Clarges Street, London, W.1. Telephone: GROsvenor 6411.

Now the world's new standard of travel

Super Constellation Style



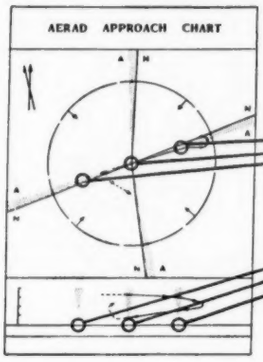
Biggest	Five separate cabins to roam through!
New Comfort	Commodious lounge - Henry Dreyfuss designed interior arrangement and styling - New meaning to "luxury aloft".
Fastest	Hours quicker to destination than ever before!
Non-stop	More flight range than ever before available - in practical airline service! (Plenty of margin to go around and over weather means on-time departure and arrival too!)
Power	To spare! With the newest type proven turbo-compound Wright engines. 13,000 horsepower.
All over the world	The swing is to Super Constellation style! 18 airlines, and more soon, have bought this plane for practical, dependable airline transportation. Four times as many as nearest U.S. types! More than twice as many as foreign jet types!

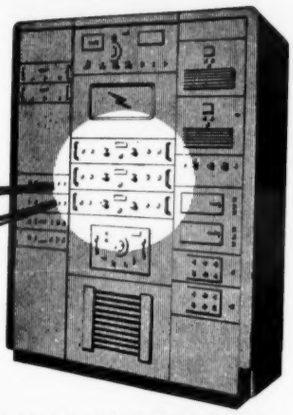
It costs no more to fly the best

Lockheed

Lockheed Aircraft Corporation USA

beacon monitor receivers . . .





mean HOMING SAFETY

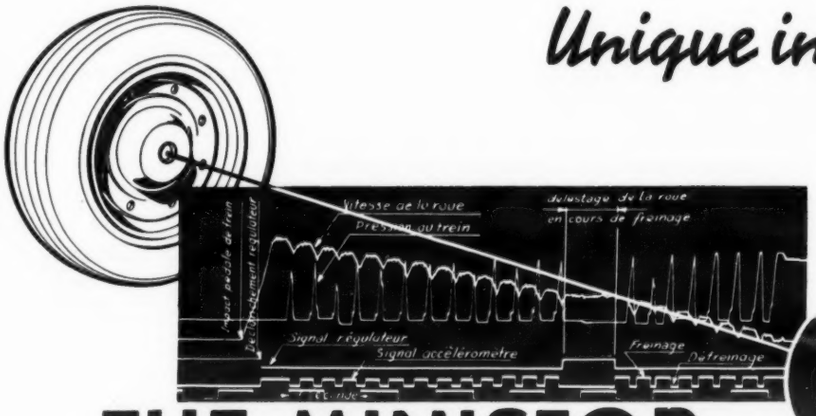
IAL BEACON MONITOR RECEIVERS (which fully conform to ICAO standards) provide automatic monitoring of high and low power MF Beacons. The constant watch they keep is a vital link in the navigational chain—their vigilance providing maximum *Homing Safety*.

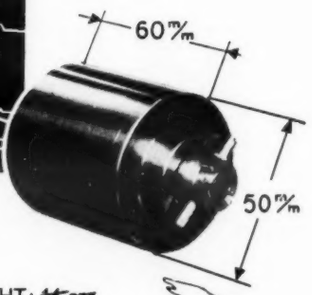
INTERNATIONAL AERADIO LIMITED

International Aeradio Limited offers the following services to navigation: Installation, operation and maintenance of telecommunications, radio and radar aids to navigation; airport management; air trafic control and aeradio training schools; briefing; aeradio and navigation consultants; systems planning; aeradio engineering projects; flight guides, trunk route manuals, maps, charts and other navigational needs.

40, Park Street, London, W.1 (HYDe Park, 5024) - Cables: Intaerio, London

Unique in the world . . .





THE MINISTOP

makes possible full use of brakes without skidding and enables:

(1) - brakes to be applied **before** landing,
(2) - load to be relieved on one wheel for any length of time,
(3) - engines to be run up on the ground,
(4) - brakes to be applied after take-off.

Simple, light in weight, small in bulk, it provides the ideal solution to the braking problem, especially for bicycle undercarriages.

Like the problem of landing, so the problem of braking is solved by . . .

WEIGHT: ~~15 ozs.~~ 11 ozs.

MESSIER

58, RUE FENELON - MONTROUGE (SEINE) TÉL.: ALE. 22-36

PUBA 6378

FIAT AVIAZIONE

THE TWO NEW TRAINERS

FIAT G 49

basic trainer

FIAT G 80

turbojet trainer

FIAT DIREZIONE AVIAZIONE, Corso IV Novembre 300 **TURIN** (Italy)

"CARAVELLE"

AVION DE TRANSPORT CIVIL
MOYEN COURRIER
BI-RÉACTEUR

JOIGNANT LES EFFORTS ET L'EXPÉRIENCE
DES

SOCIÉTÉS NATIONALES
DE
CONSTRUCTIONS AÉRONAUTIQUES

DU SUD-EST
6, AVENUE MARCEAU - PARIS (8e)

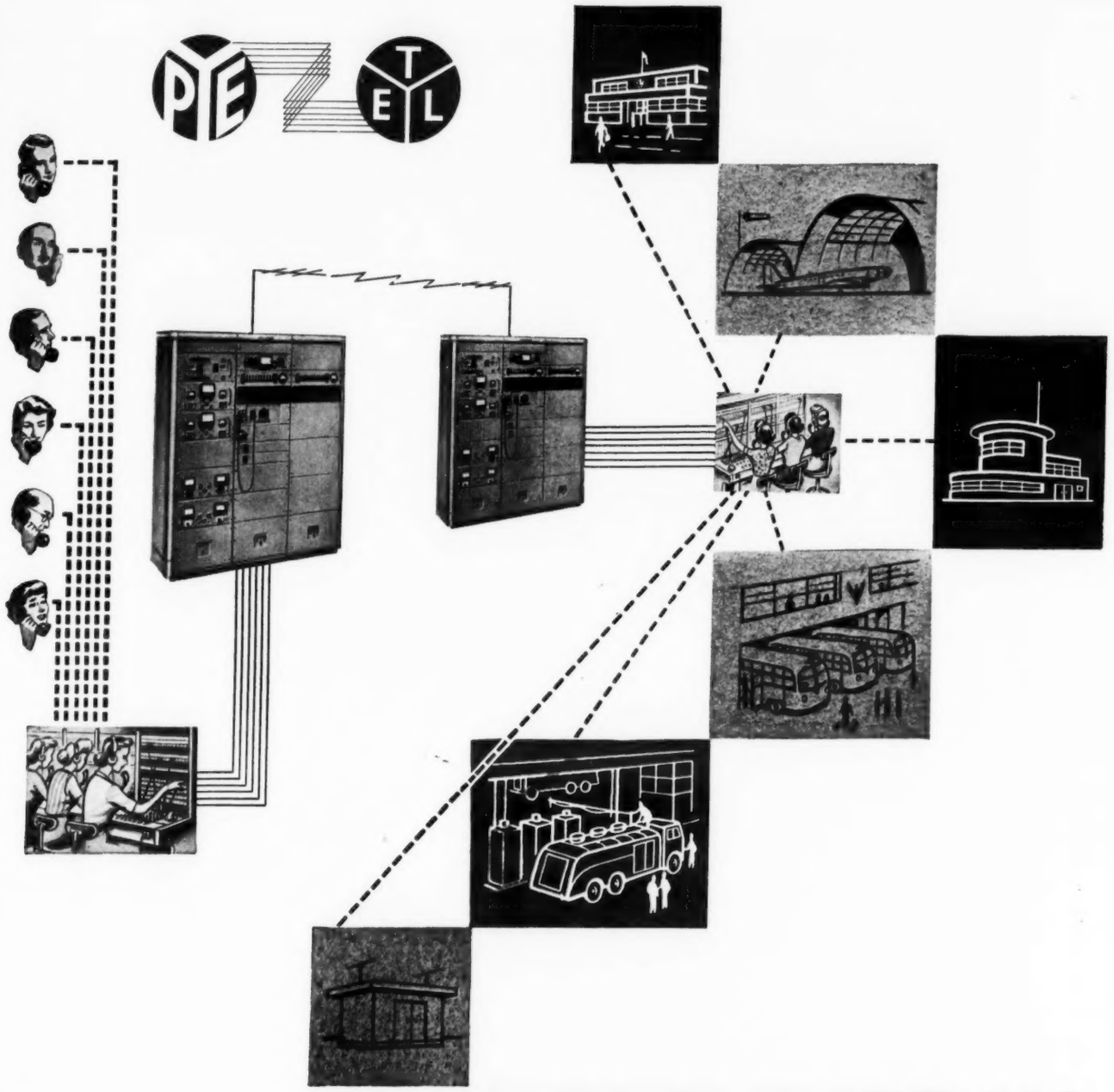
ET DU SUD-OUEST
105, AV. RAYMOND-POINCARÉ - PARIS (16e)

Radar for the Jet Age

The rapid and safe landing of the modern fighter demands a radar of the highest quality — accurate, reliable and speedy in operation. Decca Airfield Control Radar 424 fulfils the most exacting requirements at an exceptionally low cost. Achieving a landing rate previously impossible, it adds vital minutes to operational sorties.

DECCA AIRFIELD CONTROL RADAR

DECCA RADAR LIMITED, 1-3 Brixton Road, London, S.W. 9, England



PYE-ERICSSON MULTIPLEX V.H.F.

RADIO-TELEPHONE SYSTEM

The Pye-Ericsson V.H.F. multiplex radio-telephone system is already making its contribution towards the rapid expansion of telecommunications in overseas territories. Primarily developed to give telephone communication where wire and cable circuits are impracticable or, as is more often the case, uneconomical, the multiplex system provides a link that is invulnerable to both natural hazard and pilferage.

The Pye-Ericsson system retains the well-established carrier technique and this, in conjunction with the inherent reliability of the equipment, assures simplicity of maintenance.

PYE LTD.,
CAMBRIDGE,
ENGLAND

PYE TELECOMMUNICATIONS CAMBRIDGE ENGLAND

ERICSSON TELEPHONES LIMITED BEESTON NOTTINGHAM ENGLAND

ERICSSON TELEPHONES LTD.
22 LINCOLN'S INN FIELDS
LONDON, W.C.2, ENGLAND

4A/3

INTERAVIA

Deadline Notes

No. 10 1953

KOREAN ARMISTICE AND U.S.A.F. ORDER CUT-BACK

The U.S. Air Force's decision to cut 965 aircraft costing $750,000,000 from the 1954 procurement programme has caused great astonishment among American aviation leaders, in particular as Defense Secretary Charles E. Wilson, addressing an American Legion meeting in St. Louis, Mo., a few days previously had said: "We must not again let our military strength drop to anything like the low level that existed after World Wars I and II. This country must continue to have air power second to none." At the same time, the U.S. Air Force was announcing cancellation of orders for 404 Republic F-84F Thunderstreak jet fighters, 175 North American F-86F Sabre jet fighters, 155 Boeing B-47 Stratojet six-jet bombers, 141 Boeing RB-47 Stratojet reconnaissance bombers, 141 Lockheed T-33 jet trainers, 66 Beech T-34 piston-engine trainers, 10 Sikorsky H-19 helicopters. - On September 16th Air Force Secretary Harold E. Talbott announced further order cuts for several thousand jet and piston engines, representing a saving of roughly $500,000,000. A joint statement by the Air Force Secretary and the Defense Secretary announced that the attainment of the 143-wing goal in 1955 would not be affected by these cuts.

RUSSIAN MINISTRY FOR AIRCRAFT INDUSTRY

The Ministry for the Aircraft Industry, which was absorbed into the Armaments Ministry after Stalin's death, has been called to life again and placed under Piotr Dementiev, new Minister for the Aircraft Industry.

NEW DAWN FOR JAPANESE AVIATION ?

After a number of years' unobtrusive preparations, the renaissance of Japanese aviation is now gathering speed:

Five Year Plan

A Five-Year Plan announced by the Japanese National Security Board (Defence Ministry) calls for an air strength of 1,400 aircraft, comprising 300 first-line jet fighters plus 200 jet fighters in reserve, 200 long-range anti-submarine and attack aircraft plus 100 in reserve, and 600 observation, liaison and training aircraft.

Jet engine production

Four of Japan's leading industrial firms have subscribed to the formation of the Japan Jet Engine Company, which is to be subsidized by the Japanese Government during the initial phase.

Research Institute

The Japanese Government is said to be planning the establishment of a centralized aeronautical research institute.

Aviation Day and autumn manoeuvres

The first "Aviation Day" since the war was marked on September 20th by commemorative ceremonies at Tokyo and Osaka. - Japanese-manned aircraft are to take part for the first time in the large-scale autumn manoeuvres beginning in mid-October.

Admission to I.C.A.O.

I.C.A.O. headquarters in Montreal was informed on September 11th that Japan had deposited its instrument of adherence to the Convention on International Civil Aviation and thus will become I.C.A.O.'s 61st member on October 8th, 1953.

N.A.T.O. AUTUMN EXERCISES

Roughly 175,000 Americans, Britons, French and Belgians, together with the U.S. 12th Air Force and a number of R.A.F. units, took part in "Operation Monte Carlo", the N.A.T.O. combined land and air exercise held on German territory in September. The object of the exercise was not to limit the defence of Central Europe to the line of the Rhine, but to make a counter-thrust towards the East. In addition to airborne forces, "atomic weapons" were used and are said to have caused "considerable casualties" - though no details are given.

* From INTERAVIA's world-wide news service, including **INTERAVIA AIR LETTER**, the daily international aviation news digest. — No part may be reproduced without written permission.

Naval and air forces of nine North Atlantic Treaty Organization countries (U.S.A., Canada, Britain, France, Belgium, the Netherlands, Norway, Denmark and Portugal) carried out a large-scale 19-day exercise - "Exercise Mariner" - during the latter part of September, to test the safety and efficiency of sea communications between the U.S.A. and Britain and between Britain and the Continent. Three N.A.T.O. Commands - Atlantic, Channel and European - were called upon to cooperate under emergency conditions for the first time, and 500,000 men were involved. Commander: Admiral Lynde D. McCormick, U.S. Navy, Supreme Allied Commander, Atlantic.

FIRST OR TOURIST CLASS SERVICES ?

British European Airways seems to be following Scandinavian Airlines System's example in paying increased attention once more to first-class traffic. The "Silver Wing" service (luxury service with hot breakfast, lunch or dinner and free drinks), hitherto limited to the London-Paris route, is to be extended to several other European routes on October 4th, including Nice, Malta, Lisbon and Gibraltar.

LUFTAG TO BEGIN PILOT TRAINING

The AG für Luftverkehrsbedarf (LUFTAG, precursor of the new Deutsche Lufthansa) is shortly to begin training the first crews for the future German commercial air fleet. It is planned to give only theoretical training and training on flight simulators in Western Germany and to arrange for actual flying training to be given in the United States. Operations Manager von Engel is going to the United States to prepare the courses and study American flight operating methods.

FRANCE TO BUILD DELTA WING FIGHTERS

Société des Avions Marcel Dassault and SNCA du Sud-Est have each been awarded a contract to build a prototype of a supersonic delta-wing fighter.

ITALIAN LICENCE SABRE

The North American F-86 Sabres to be assembled and produced by Fiat S.A. under off-shore procurement will be designated F-86K and will differ from other versions of the Sabre by the absence of certain electronic equipment and by modified armament.

*

WORKSHOP BRIEFS ...

The U.S. Air Force reports that the McDonnell F-101 and Convair F-102 jet fighters are to be fitted with Pratt & Whitney J-57 jet engines, while the Republic F-105 is to have the Allison J-71. Both engines deliver a take-off static thrust of roughly 10,000 lbs without, and 13,000 lbs with reheat. * The Northrop F-89D Scorpion twin-jet fighter (Allison J-35 with reheat) carries an armament of 104 rocket projectiles. * A tanker version has now been made of the North American AJ-1 Savage three-engined naval combat aircraft; it uses the British probe-and-drogue system for in-flight refuelling. * The U.S. Marines are shortly to take over a first Sikorsky HR2S twin-engined combat helicopter. The type is fitted out to carry 25 fully-equipped soldiers. A projected civil version, the S-56, would have accommodation for 40 passengers and be powered by turbojets. * First tied-down tests of the Piasecki YH-16 twin-engined helicopter (Pratt & Whitney R-2180's of 1650 h.p. each) are announced. First flight scheduled for early November. * Saunders-Roe P.121 is the type designation of a projected naval fighter with "hydro-skis". * The latest version of the English Electric Canberra, now in production, bears the type designation Canberra PR. Mark 7 (photographic reconnaissance). * The first prototype of the SO 9000 Trident is now being fitted with the rocket engine planned for it. It is assumed that the Trident with this engine will be able to fly faster than sound even on the level. * The Potez 75 two-seat ground attack and anti-tank aircraft is undergoing tests at Brétigny Flight Test Centre. The first phase of the official acceptance tests has already been completed with satisfactory results.

* * *

Prologue to I.A.T.A.'s Ninth Annual General Meeting

MONTREAL, OCTOBER 5TH TO 9TH

On the next few pages we have the privilege of printing an article by Sir William P. Hildred, Director-General of the International Air Transport Association. At the end of it the reader will be left with the feeling that the author—unlike the presidents of so many societies and associations—has not just been making pretty speeches. It is rumoured that Sir William has agreed to stand for a further period of office with the Association, although there are said to be quite different and more attractive duties awaiting him elsewhere. In his examination of the prospects of world commercial aviation, he shows dispassionate judgment and conscientiously avoids a too rosy optimism.

He rejects any suspicion of excessively naive calculation ; the 1939-1949 decade in air transportation saw operating figures increase tenfold over those for the 1929-1939 decade—but Hildred is not ready to forecast that the 1949-1959 period will necessarily bring another 1000-percent increase. He cautiously suggests that an annual figure of 100,000,000 passengers can be expected by 1960 . . . provided there is no substantial set-back in world economy.

Hildred then touches upon the problem of finance—a problem that is perhaps becoming increasingly difficult for non-American airlines. He speaks of a "tangle of interdependent rates." He cautiously examines the first results of tourist or second-class services. He calls for a replanning of the air cargo business, in particular as regards flying equipment. Finally, he expresses his confidence in the helicopter for short and medium hauls, possibly as early as 1960.

Such reflections from the pen of a man who has given full evidence of his ability, first as Director-General of Civil Aviation in Britain and then as the chief architect of the world-wide International Air Transport Association, are more convincing than the painstaking elaborations of the steadily increasing horde of theoretical writers.

*

Hildred forecasts, then, an annual flow of a hundred million passengers seven years from now, i.e. roughly double the number that can be expected for 1953. The most recent authentic figures as published by official sources are as follows :

The inter-governmental International Civil Aviation Organization has calculated that total passenger volume in 1952 was roughly 45,000,000, excluding Russian and Chinese figures, which are not available. The U.S. Civil Aeronautics Board, for its part, has announced a figure of 27,000,000 passengers on American domestic and international services. It is easy to calculate that this leaves 18,000,000 passengers for Europe, South America, Africa, Middle and Far East and Australia. As in so many other directions today, the United States lead the world here too by 60%.

There can be little doubt that great diplomatic skill is required to reconcile, within an association based on parity, such powerful American interests with those of the nations which have been less favoured by fate. Hildred, the Englishman, appears to have succeeded admirably here.

At present I.A.T.A. unites sixty-six member-airlines from throughout the world. Yet it is not the only association of its kind. Alongside it comes, first and foremost, the powerful Air Transport Association of America, a regional organization, with roughly forty members. And I.C.A.O. recommended at Brighton in July of this year that the Council of Europe's suggestion for a European air transport conference be taken up. This conference is to meet during the winter of 1953-1954, though there is as yet no question of making it into a permanent organization. Would such a "permanent instrument"—the question is put most tentatively—be likely to spoil I.A.T.A.'s game ? We do not believe so. It would no longer be possible to do away with I.A.T.A. A year ago we wrote : "There is no doubt about I.A.T.A.'s achievements, and all are convinced of its indispensability in international air transportation."

*

Yet something seems to be in preparation in the European region, now that such concepts as the Coal and Steel Community, the European Defence Community, Sforza Plan, etc. have been envisaged or realized. The problem of European cooperation in the air is being given considerable attention. For example, Dr. Walter Berchtold, President of Swissair, who is now retiring as I.A.T.A. President in favour of his Canadian colleague, T.C.A.'s President, Gordon R. McGregor, pointed out at the end of August[1] that every man, woman and child of the 162 million Americans flies an average of 100 miles a year, whereas each of the 260 million Western Europeans flies only 15 miles a year.

In considering the reasons for this unbalanced relationship Dr. Berchtold stresses the following factors : Americans live in more widely separated centres of population, which encourages travel. In Europe population is more evenly distributed, which has an adverse effect on "mobility." The division of Europe into numerous small countries, each with its own currency and more or less independent national economy, also tends to reduce travel. Again, the network of ground transport services is denser in Europe than in the United States—another handicap for air transport. Berchtold finally recalled the indisputable dependence of Europe on seasonal visitors and tourist traffic and the substantially lower income of the average European. In his view traffic volume is too low to enable the necessary frequency of services to be obtained in business traffic.

The list of obstacles standing in the way of a European "air travel boom" could be considerably lengthened. We could repeat the well-worn argument that air travel is not worth while for distances of under 300 miles, that American success is due to the wide-open spaces of the United States, and the European lag to the cramped nature of the countries with their passport and customs difficulties.

A conscientious business man, Swissair's President is anxious to discover how European air transport can be kept economically sound and how to avert the danger of a recession in the event of an economic slump. Fares have been falling for some years, while personnel and equipment costs, and particularly the steadily rising costs of aircraft, have had an adverse effect on balance sheets. Costs could be reduced

[1] *Neue Zürcher Zeitung*, No. 1957, August 28th, 1953

by increasing the load factor, rationalizing upkeep and "expanding turnover." Dr. Berchtold sees salvation in a balance between three decisive, interdependent factors : a reduction in rates, expansion of traffic and reduction in costs. Where does he hope to begin ? Presumably with a reduction in costs, which would enable rates to be lowered and hence traffic to be expanded. But he himself says that prices of flying equipment, expenditure on personnel, etc. are rising, so that it is not altogether clear how, in the present state of affairs, he can achieve any very effective cost reduction. On the other hand, he complains of the European's lower income level compared with the American's, but fails—like his other European colleagues—to mention the fact that the travelling American can fly not only relatively but absolutely much cheaper, at any rate on domestic routes, than the European in Europe.

*

An American contemporary of ours recently made the following, not altogether flattering, comment on European transport planning [2] : "... What actually happened (in Europe this summer) was the virtual disappearance of first class air service from all of Europe. The airlines turned their backs on the very passenger who had been the mainstay of their existence during the past twenty years and went after the so-called mass market, which turned out to be non-existent for them for the simple reason that the lowest fares that the airlines can offer aren't nearly low enough to reach the masses in Europe. What has happened this summer is a rather frank admission that the European airlines are still inexperienced in the transportation business and don't know their own missions and markets. Some of them must have thought that Europe was the U.S. where the 'masses' actually do have money and relatively greater freedom to travel and do as they please. But in Europe, the 'masses' are scarcely able to travel by air at anywhere near current fare levels. Some airlines also may have felt that they would attract American tourists by low-fare services, but the average American tourist wants to travel by rail, bus or car in order to see the country, and those Americans who do fly in Europe will fly regardless of cost and prefer comfort and convenience above everything else . . ."

All this should not necessarily be taken as gospel. Europe is poor, and the European would be just as keen on flying as the American if he could afford it.

Our American contemporary overlooks the fact that, unlike the Americans, European airline managements did not have time to make a thorough market survey. The Americans had been able to study the problem for years—thanks to the experience of the mushrooming non-skeds after the war. The Europeans, on the other hand, had decided somewhat hastily on tourist class services at the I.A.T.A. Traffic Conference in Nice last year and had to find a compromise between advocates and opponents of the tourist-class system. Naturally a reduction of twenty-five percent on the first-class fares (considerably higher than in the United States) is not enough, certainly not to reach the European masses with their lower average income.

What was the result ? The number of seats per aircraft was increased, which did not exactly increase comfort, and a smaller reduction in fares was made, in the hope that travellers would storm the booking offices. At the same time, however, air travel was made more costly by reducing the free baggage allowance from 44 to 33 lbs., making a high charge for every pound of excess baggage and apparently failing to realize that 33 lbs. of baggage, though enough for short business trips, is not sufficient for longer pleasure trips. The introduction of a charge for transport to the airport was justified and has made little difference. But the imposition of head taxes by airports on arriving or departing passengers—as has been done at some places—does not really help the new services to succeed.

[2] *American Aviation*, August 3rd, 1953, p. 9

Some kind of changes must obviously be made. Per A. Norlin, President of Scandinavian Airlines System, has indicated that he proposes to return to a larger number of first-class services during the coming winter season, without, however, entirely neglecting the tourist class. On the contrary, it may be that a I.A.T.A. traffic conference will soon recommend that European fares be more closely adapted to American, to ensure that the labyrinth of special rates, such as has grown up in South America, shall not appear in Europe.

*

A word on the problem of closer cooperation between the European airlines which Swissair's President, as present President of I.A.T.A., fundamentally approves. He rejects, however, the idea of a so-called pan-European solution, of a single European undertaking, "since it would completely disorganize the national undertakings which have grown up organically." He recommends instead a study of the ways in which European airlines can work together to provide more rational and economic service, ensure better utilization of equipment, perhaps by exchanging aircraft, coordinate equipment planning, standardize ground services, etc. Dr. Berchtold's company has made a beginning in this direction, it is rumoured, by coming to friendly and very satisfactory agreements with S.A.S. in Scandinavia and Sabena in Belgium. Some of the larger airlines, who can afford to remain independent, are still holding aloof, such as the British corporations, Air France and K.L.M. Royal Dutch Airlines, for example. They will undoubtedly be pleased to join in any attempt to arrive at improvements, but what practical solutions can be found for European economic cooperation in air transport remains to be seen.

Inter-European solutions have already been found or are in preparation on political, military and heavy industrial levels. But nationalism still seems to hold sway in air transport, just as it did in graver matters in the good old days of the League of Nations twenty years ago.

*

To sum up : Sir William Hildred considers that a third phase, no longer a boom period, has begun in air transport throughout the world. Within the decade from 1939 to 1949 there was an increase in traffic volume by 1000 percent and he anticipates a 100-percent rise for the period from 1953 to 1960.

American air transport is economically sound because airlines can buy their flying equipment and their fuel and lubricants relatively cheaply inside their own country ; they have been able to make drastic reductions in rates by introducing the coach class and in 1952 already carried 60 percent of all passengers in world air transport.

American domestic air transport has much less competition to face, as the Civil Aeronautics Board distributes routes on an economic basis and through mergers aims at reducing the present sixteen major airlines to an ideal six to ten.

European airlines operate their overseas services in competition not only with American and other foreign companies but also with a number of airlines from their own continent. Planning of European regional traffic on American lines is still not possible, as there is no supra-national aviation authority.

Amalgamation between European companies seems to be out of the question at present, as there is nowhere any real enthusiasm for a pan-European solution.

An expansion in European traffic volume is subject to the same limitations as Hildred forecasts for world aviation in the next seven years.

Examination of rates, the possibility of reducing costs, rationalization . . . cooperation ? Enough of talking, let us see some concrete planning. *EEH.*

International Air Transport—Prospect and Retrospect

BY SIR WILLIAM P. HILDRED, C.B., O.B.E.,

DIRECTOR GENERAL, INTERNATIONAL AIR TRANSPORT ASSOCIATION, MONTREAL

Sir William P. Hildred, Director-General of the International Air Transport Association, poses just outside I.A.T.A. headquarters.

For several years *Interavia Review* has done I.A.T.A. the honour of devoting a special issue to our annual gatherings. They were with us at The Hague in 1949, San Francisco in 1950, London in 1951, Geneva in 1952. Now it is 1953, and the meeting is being held in Montreal—the home of I.A.T.A. and of its sister organization, the International Civil Aviation Organization (I.C.A.O.). In each of those years, *Interavia* has tried its best to give a world picture of international civil aviation and has, in particular, collected comprehensive information relating to the operations and resources of I.A.T.A. members.

This year I have been asked to add a few words to this issue and to think aloud about I.A.T.A. and international civil aviation in general. This is, indeed, a good opportunity for me to do so. After eight years our Annual General Meeting is being held once again in Montreal. In October, 1945, a handful of airlines got together in Montreal to consider the re-organization of an association of the world's airlines. As successors of the pre-war *International Air Traffic Association,* they had a rich background of concrete achievements and devotion to duty which that organization evidenced in the more circumscribed field of its operations. However, after the war it was, by and large, necessary to start from the beginning and by trial and error to evolve a new association which would function efficiently and economically and would further the development of air transport in the interests of the peoples of the world.

One of the great unknowns in those days was the extent to which the public would take to the form of transport which had changed so radically since the pre-war years. True, in the 1930's the rate of expansion of air transport was very remarkable. In fact in terms of percentage increases, the strides made year by year in the pre-war years were probably as spectacular as anything achieved in the post-war years. But the absolute numbers were few, and flying—at any rate over the great trunk routes of the world—was an adventure rather than the normal and perhaps unexciting event of today. Then, after six years, during which civilian air transport was operating for the most part under the strictest priority system and military control, the man in the street would once again be allowed to fly as he pleased and go where he would. Yet, the most recent memories that he would have of the aircraft would be of an engine of war, not an instrument of peace. Would that kind of memory affect his desire to fly or, indeed his desire to travel ?

This unknown factor had to be set against the enormous technical progress in the development of aviation which had been achieved in the forcing house of wartime development. The ideas of the 30's had to be revised rapidly to take into account the enormous potentialities of postwar air transport which were foreshadowed by technical developments. At the same time, the commercial organization of airlines had, in many cases, been completely destroyed and in others put into cold storage for the duration of the war. These airlines, meeting in 1945, had to fact the future basing themselves on a rich but distant past and an improvised and inadequately explored present. Only a few of the airlines at the 1945 meeting were carrying on normal commercial operations. Others were operating under government or military control and a few were still in the stage of initial organization.

The airlines in 1945 would not, therefore, have been able to cope with long-range problems and issues of major policy. Fortunately, they were not called upon to do so. The pent-up demand for air travel and the shortage of flying equipment combined to produce a shortage of space on aircraft which it took several years to overcome. Long-range considerations of policy were therefore pushed into the background in an effort to keep the aircraft flying and to ensure the maximum possible utilization of existing equipment.

Financial criteria also had to go by the board ; it was the duty of every airline to provide with its inadequate fleet of converted military aircraft the maximum of output consistent with maintaining essential standards of safety. Yet even in those days the backroom boys were working. Somebody had to consider the state of aviation in 1950 and the years beyond. Yet such has been the expansion of air transport that I cannot recall any of the forecasts made in those days which have kept pace with reality. Nobody apparently dared to use arithmetic as simple as this : 1939 air traffic (measured in passenger kilometres) was about ten times the 1929 figure. Therefore, it might follow that the 1949 figure would be ten times that of 1939. We now know that it was in fact more than that and we can congratulate ourselves on the result. *Nevertheless, fast as air traffic is growing, I would not dare predict a ten-fold increase for 1959 as compared with 1949.* The current figure is running at about twice the 1949 rate. It would have to increase five times in order to maintain the trends of earlier years. This is by no means impossible, nor is it unlikely, but I would have some difficulty in presenting it as a firm forecast. *If I were to make any long-range forecast at all, I would be inclined to venture the figure of one hundred million*

Technical problems are discussed by I.A.T.A. at its annual Technical Conference. The sixth was held from April 20th to May 2nd at the Caribe Hilton Hotel, San Juan Puerto Rico, and included a three-day symposium on helicopters. *Left to right :* Stanislaw Krzyczkowski, Secretary, I.A.T.A. Technical Committee ; Captain J. C. Kelly-Rogers, Deputy General Manager, Aer Lingus (Irish Airlines) ; James Adams, Technical Assistant, South African Airways ; J. T. Dyment, Director of Engineering, Trans Canada Air Lines ; James Robinson, Assistant Secretary, I.A.T.A. Technical Committee.

passengers for 1960. This is twice the current rate and may seem unduly optimistic considering that we are now dealing with such large quantities. I would, therefore, qualify it by saying that this figure is *based on the assumption that there will be no major down-turn in economic activity in the world* at large or any particularly significant section of it.

Incidentally, this latter assumption underlies all current airline planning and long-range policy. We realize that air transportation cannot affect, to any measurable degree, the massive forces which determine the general level of economic activity. We must, however, make some general forecast about future trends of air traffic, and we have found it most consistent with current trends and with efficient public service to assume that the level of world production and consumer demand for things in general will remain no lower than it is today.

To come back to the post-war history of international aviation, this can be divided into *two stages* which were experienced by every airline, if not to the same extent. The first stage reflected the post-war shortages and difficulties, the inadequacy of equipment, ground installations, airports and air navigation facilities. This was coupled with strains and stresses within the organizational structure of each airline. Reorganization succeeded reorganization as an empirical search was being conducted for the most efficient utilization of available resources. The second stage is the beginning of a period of relative plenty — a period when the airlines have, by and large, enough equipment, enough manpower, and where the airports and air navigation facilities have developed to such a degree that acute problems of routing and navigation have been overcome. This also happens to be the period when the airlines have to consider much more seriously than they did in the early post-war years, the need for developing air traffic, for selling cargo space and passenger capacity and for making sure that every dollar that is spent is spent productively.

There is only one shortage which the airlines have to cope with now, and that is money. The day is gone when subsidies were being freely handed out by governments still accustomed to the astronomic expenditures of the war and immediate post-war years. Tightening of the belts is the order of the day and it heralds the *approach of the third stage* of the post-war development of air transport where, with adequate equipment and an accumulation of post-war experience, we have to face the problems which beset every industry which needs to be financially independent. Technical and economic efficiency are now in the forefront as the guiding principles of airline organization. A drastic streamlining of the way in which the business of the airlines is carried on will be necessary within the next few years, if economies are to be achieved. Some of the costly and cumbrous procedures which delay and impede air transport are beyond our control. They are the result of government regulations and are almost as much a problem in 1953 as they were in 1945. We are trying our utmost to have these obstacles removed and have achieved some successes, but the task is an unending one, since a large share of the inventive spirit of humanity is directed towards making life difficult for others.

There are, however, certain unnecessary complications in airline organization and practice which could be eliminated by adjusting the methods used to the new, expanded scale of operations. For example, neither the railroad nor the bus company knows the names of all the passengers on board, nor are they obliged to supply the names of their passengers to the immigration authorities. Similar procedures would be appropriate and advantageous in air transportation, at any rate for short-haul air services. Another advance, which I hope will soon be made, is the simplification of the world-wide international tariff structure. Unlike that of any other means of transport, our rate structure is truly world-wide and a change in rates at one point has repercussions on all other fares ; yet the construction of fare tables for the entire world is getting more and more complicated especially as new types of service are being introduced. Sooner or later some means will have to be found to cut through this tangle of interdependent rates and produce a simple system of computation which could be applied to fares between any two points.

An illustration that airline thinking on some of these problems has shown considerable progress is given by the attitude to passenger service and its relationship with the level of fares. In the early post-war years the provision of flying comfort was regarded almost as an end in itself. Nor could this be wondered at—no airline executive could fail to be proud when his obsolete, uncomfortable military conversions were replaced by civilian airliners which were not only much more efficient and economical but were also designed expressly for the carrying of passengers. Instead of a rudely furnished, unpressurized, noisy bomb-bay, passengers were given a finely and luxuriously appointed cabin. The immediate temptation to turn these aircraft into flying luxury liners with the best of service was only slightly kept in check by the need for economy. Many of us would feel the same way if, after years of barrack life, we returned to a home of our own which we were able to furnish to our taste.

Sabena, Belgian airlines, inaugurated the first international helicopter services this year. Sabena and other companies had previously operated experimental domestic passenger and mail services. *Above :* A Sikorsky S-51 helicopter of British European Airways at the South Bank helicopter landing site, London.

Now that the novelty has worn off, a more realistic attitude to flying comfort is taking its place. The provision of luxury services is an expensive proposition not only because the furnishings, meals and service are costly in themselves, but also because they account for a fairly noticeable proportion of the payload which the aircraft is able to carry. The tendency, therefore, has been towards the provision of two types of service—tourist and first-class—which offer differing levels of service and luxury. This differentiation of air services to take account of the varying needs of the public and their respective ability to pay has been an important feature in the last few years. In the early post-war years, travelling by air implied only one choice of air fare as compared with the two or three possibilities offered by the

railroads and shipping companies. With the expansion of air traffic, with the increase of equipment available and of the preoccupation of airline managements with tapping new markets, air fares have been developed to cater to all purses. Fortunately, airlines have been able to hold the line as far as the level of first-class fares is concerned, and all new fares introduced have involved a reduction from the first-class level. At first, these reductions were designed for off-peak services in order to encourage travel in the hours when the aircraft would normally have been standing idle. Next, regional differentiations were allowed to certain operators using older and slower equipment. Finally, the door to cheap travel was thrown open through the introduction of tourist services.

I do not wish to dwell on this particular story to any great extent because this has been done already many times over in the short period that tourist services have been in operation. All I need say is that tourist services will span the world within the next year and that wherever they have been introduced they have proved a great success. *The long-run significance of this development is, however, worth considering.* There is obviously a wide market for at least two types of air travel as there is in railroad and steamship transportation. Whether further differentiation can be permanently continued is a doubtful question. The equivalent of the luxury steamship first-class suite is the private aircraft. While some of these are in existence, it would hardly pay an airline to run one as a commercial proposition. There are, it is true, certain routes where three types of air service are in operation but this might not last indefinitely. We are, therefore, likely to see with a fewin years air travel settle down into two levels of fare. The tendency, however, will be towards increasing the tourist frequencies at the expense of first-class operations. This is already evident in Europe where the tourist services introduced last April have shown themselves to be eminently successful. First-class operations were confined to a few of the high-density routes. This changing European pattern was dictated by the consideration that on short-haul routes the advantages of luxury services do not as a rule compensate for the higher fare which has to be paid. In long-haul operations, the premium set on greater cabin comfort may not be considered excessive but, within Europe, speed and price have been the determining factors.

It is unlikely that these basic considerations will be affected by the introduction of new aircraft. These are already being designed and put into production in such a way as to provide the maximum adaptability of cabin space to any seating capacity desired. Thus, in future, the allocation of services between first-class and tourist operations is likely to be decided according to the traffic potentialities of a particular route. The absolute level of fares will naturally depend on the level of operating costs and any economies are likely to be passed on equally to both types of service. At the same time the relationship between first-class and tourist fares is also likely to vary from route to route and will depend to some extent on the competition from other forms of transport.

The world-wide expansion of tourist operations must also bring with it a *new policy on cargo traffic*. On most existing aircraft types, the cargo capacity has to be restricted when high-density seating is introduced. Now, more than ever, a successful expansion of air cargo traffic depends on the development and extensive use of all-cargo aircraft. On existing aircraft types, it is much more profitable to carry a ton of passengers than a ton of cargo. However, an economical all-cargo type should make it possible to carry cargo at a profit even with a considerable reduction of rates. Possibly one ought just to make sure that the aircraft developed is unsuitable for carrying passengers !

I must not conclude this brief survey of current aviation trends without a reference to *helicopters*. Earlier this year the first international helicopter service was inaugurated by SABENA, one of I.A.T.A.'s oldest members, which celebrated the thirtieth anniversary of its existence this year. Other airlines have already been using helicopters in domestic passenger operations for a number of years. Now increasing attention is being given to the development of the helicopter as a commercial proposition. It will probably be a few years before suitable types can be developed to make door-to-door flying financially profitable as well as attractive from the point of view of the passenger. It is certain, however, that by 1960 some important helicopter routes will be in operation and these may once again transform the pattern of short-haul air operations. In 1960, as now, I.A.T.A. will play its part in doing its share to ensure that such operations will be a success.

Two fare levels will become general in air travel in the next few years: first class, as exemplified on Pan American-Grace Airways' "El Inter Americano" service to South America. Photo shows the "Fiesta Lounge" amidships the Douglas DC-6.

The lower fare level will be that of the "tourist" services.

This last remark gives me an excuse to offer in conclusion some comments on the function of I.A.T.A. I do not wish to go over the familiar, if occasionally labyrinthine, landscape of I.A.T.A. organization. I would instead like to refer to the relationship between I.A.T.A. and the public. It has not been easy during the last few years to keep pace with the urgent public demand for lower fares. We have done our utmost in that direction and intend to go on doing so ; but it is hard to convince people that this cannot be done faster and cannot, in many cases, be done without the airlines continuing to rely to some extent on state support. Our ultimate aim is cheap travel and economic self-sufficiency. Some of the intermediate steps, however, are not so attractive to a public which desires to make maximum use of air transport.

In our relationship with the public we have to rely on the good will and understanding of three intermediaries. The first are the governments which interpret and act on public opinion. We have had some difficulties in putting forward the views of the airlines, especially to governments which are already harassed and perplexed with major economic and financial problems of their own. We trust, however, that wise counsels will prevail and that I.A.T.A. will be allowed to play its part in furthering the cause of international air transport in the public interest.

Our second intermediary is the agent whose importance as a link between the passenger and the airline can hardly be overestimated. In this case, too, we have had some initial difficulties and misunderstandings. We realize that because of the mutual dependence of the airline and the agent on each other, no effort should be spared to eliminate all sources of friction. Basically both parties have the same interest which is to expand air traffic as much as possible and to serve the public economically and efficiently.

Finally, a word about the third link—the press. Our relations with the press over the years have been excellent. This applies equally to the technical aviation journals who are interested in the ins and outs of our activities and to the newspaper world in general which has followed our major technical achievements as well as our steps to bring cheap travel to the public. If we continue to get the same treatment in the future as we have in the past, we shall be very happy and we shall do our utmost to play our part in this relationship.*

All being well, therefore, the airlines are looking forward to a close relationship with their ultimate masters—the public, both those who are travelling now and those who hope to travel in the future. For our part, we shall do all we can to bring air transport within the financial means of the largest possible number of people. All we ask in return is a little patience in an effort to understand some of the difficult problems the airlines have to face in their day-by-day effort to provide safe, regular and economic service to all.

---

* For a press opinion on how this can be ensured, cf. page 570 of this issue. – *Ed.*

I.A.T.A.'s Big "At Home"

At the beginning of this month representatives of more than sixty of the world's airlines forming the *International Air Transport Association* are holding their first real "at-home" at the organization's permanent site in Montreal on the occasion of I.A.T.A.'s Ninth Annual General Meeting. Eight years ago almost to the day many of these same men gathered at the Windsor Hotel in Montreal for the first General Meeting of I.A.T.A. As now, they were interested in setting up voluntary, self-imposed regulations to further their common aim of cheap, safe and regular air services.

A Canadian President will take office for 1953-54 in the person of Gordon R. McGregor, President of Trans-Canada Air Lines, which, jointly with Canadian Pacific Air Lines, will act as hosts to the Meeting.

At the first annual general meeting of I.A.T.A. at Montreal eight years ago, under the presidency of H.J. Symington, former President of T.C.A., Sir William P. Hildred, then Director-General of Civil Aviation in Great Britain, was confirmed as Director-General of the body. His dynamic energy had been exemplified during the war in the establishment of a wartime ferry organization through Montreal across the North Atlantic to the United Kingdom. Dr. Lawrence C. Tombs, a Canadian who had often represented the League of Nations at pre-war I.A.T.A. meetings, was then Secretary. After setting up the Montreal headquarters, he has since returned to private business in Montreal.

At that first meeting, representatives of 42 airlines answered the roll call as members and 18 more as associate members. The four basic I.A.T.A. committees—Financial, Legal, Technical and Traffic—were set up and immediately settled down to work.

The aims and objects of the Association, as set up at Chicago in 1944 and later incorporated in the Canadian Act of Parliament creating I.A.T.A. were the following :

1. To promote safe, regular and economical air transport for the benefit of the peoples of the world, to foster air commerce and to study the problems connected therewith.

2. To provide means for collaboration among the air transport enterprises engaged directly or indirectly in international air transport service.

3. To co-operate with the International Civil Aviation Organization and other international organizations.

The words of H. J. Symington at the meeting merit repeating because they are still apt today :

"... the world is and for some time will be on the edge of an abyss. Not only must this Association so conduct itself as not further to jeopardize the situation but, if it is true to its avowed aim of being for the benefit of the peoples of the world, it must actively and constructively contribute to the betterment of the situation. It must avoid like the plague any action or any thought or suggestion which could even remotely contribute to world chaos and it must courageously and selflessly contribute to world order. In accordance with its further declared aim and object, namely, to co-operate with the International Civil Aviation Organization, it should direct its efforts and operations so that that most important body, representative of the Governments of the world, may come to a satisfactory and absolutely necessary decision as

to an ordered air expressed in a world-wide permanent air convention . . . Because if there is peace in the air, there should be peace in the world. Only thus can this Association obtain the respect of the world and avoid deserved oblivion."

To handle its expanded world-wide responsibilities, to digest into the world network the whole new body of transport practice and experience of the New World, and to cope on behalf of its members with a greatly extended and intensified government interest in their operations, I.A.T.A. brought into effect at that first Montreal meeting new administrative machinery. An Executive Committee, whose 13 elected members were to hold office for three years, was vested with the direction of I.A.T.A.'s continuing affairs. Standing committees were provided for and the positions for three Executive Officers created and branch offices established in New York, Paris and Singapore as well as a Clearing House in London.

I.A.T.A., of course, followed I.C.A.O. in setting up its headquarters and staff at Montreal. Like I.C.A.O. it adopted English, French and Spanish as its working languages. Its 120 employees, most of whom naturally are Canadians, act as a secretariat. Its budget of approximately $685,000 a year is financed by its members according to the amount of the total international traffic carried by each.

From time to time, there have been attempts to move I.C.A.O. and I.A.T.A. from Montreal, but it now seems as if this city will remain the world's air capital indefinitely. The "move from Montreal" faction seem

Gordon R. McGregor, 1953-54 President of I.A.T.A. and President of Trans Canada Air Lines.

A. J. Quin-Harkin, Manager of the I.A.T.A. Clearing House, London.

to be satisfied with the general arrangement to hold the annual meetings of both organizations at various cities throughout the world, although there is now a trend to have an I.A.T.A. General Meeting at intervals of two years.

Montreal obviously has many advantages. It is close to the United Nations, parent body of I.C.A.O., and close to the aviation activity of the United States without being in the U.S.A. itself. Right from the Chicago Conferences, there has been considerable opposition to a site in the U.S.A. Montreal also is conveniently located so far as air travel is concerned with the rest of the world, being on the shortest routes between the great centres of population of the Eastern and Western hemispheres. I.A.T.A. and I.C.A.O. now conduct their business in a modern building, specially designed for the purpose and contributed to them by the Canadian Government.

The Canadian atmosphere seems favourable to an international organization. Being a small nation, Canada can take and has taken leadership in such organizations without offence either to smaller or larger nations. Though small in population, her air power ranks next to that of the U.S.A. and the U.K. in the Free World and so she can speak in aviation matters with authority. Canada is naturally interested in both I.A.T.A. and I.C.A.O. because a good proportion of the air traffic of the world will soon pass over this country.

Right from the beginning of I.A.T.A. and I.C.A.O., Canada served as a mediator between diametrically opposed American and British views on the economic regulation of air transport. The American Government's stand was for free competition by any and all comers, while

The International Aviation Building at Montreal houses not only I.A.T.A. headquarters but I.C.A.O. and a number of airline offices as well. The Canadian atmosphere seems favourable to international organizations.

the British advocated a degree of international control to protect the interests of the various countries providing air transport service. Lacking agreement, international aviation faced a return to the pre-war chaos of uninhibited, cut-throat competition. The Canadian view which, incidentally, much resembles I.A.T.A.'s, has advocated a system in which traffic rights will be exchanged freely on a multilateral basis. Canada has called for progressive action along this line, and, as neutral as possible in the quarrel, has stated she is not afraid of her position in the air world if she has to resort to the horse-trading of bilateralism.

Under the present arrangement reached at the Bermuda conference in 1946, the various Traffic Conferences of I.A.T.A., the only bodies which had any practical knowledge of airline costings, determine equitable rates, although they cannot become effective until both Governments have approved them—if necessary, after review of the economic data on which the rates are based. By this means, both Governments obtain what they desire : control great enough to assure that, on the one hand, rates will not become involved in cut-throat competition and, on the other, that they can be kept as low as possible.

Since 1946, the airlines of the world have more than doubled the number of passengers they carry and today are carrying five times the volume of cargo they did then. Last year the world's airlines completed 39,500 million passenger-kilometres. Translated into layman's terms this means some 1,000,000 people, roughly the population of Montreal, were transported a distance equivalent to that from their city to Western Europe or to the valley of the Amazon. From 1946 through 1952 the total revenue traffic of the scheduled airlines (passengers, cargo and mail together) increased neither less than 13 per cent from one year to another, nor more than 23 per cent, sure proof of orderly growth.

Some 1000 new transport aircraft were delivered to airlines from 1946 to 1952, with a total value of $750 million. The maximum delivery in a year was over 200 in 1948, and again in 1952 ; the minimum about 100 in 1951. At the end of last year, well over 400 transports with a value of some $400 million were on firm order for delivery during the next three years.

In 1946 there was almost never more than one class of passenger service, and seasonal variations in rates were a minor factor. As a result of the efforts made by I.A.T.A. members, off-season reductions and excursion rates became increasingly prevalent in the years from 1947 to 1950. Reduced rates were also made for the less popular flights and for the less popular days of the week. The major change in international passenger rate structure, however, came with the introduction of tourist services on the North Atlantic last year. The tourist fare was set at

about 30 per cent below the first-class rate. Tourist rates have been extended to many other routes, including those within Europe, this year.

The minimum passenger fare across the North Atlantic, stated in dollars, is now about 25 per cent lower in summer and nearly 40 per cent lower in winter than the corresponding minimum just after the war ; while for travel within Europe the minimum fares next year will be a little lower than the corresponding minima in 1946 when stated in most European currencies and about 40 per cent lower than in 1946 when stated in dollars or in Swiss francs.

These reduced rates have meant more business. During the last eight months of 1952, the air tourist passengers on the North Atlantic outnumbered first-class travellers by about 25 per cent ; two of the airlines operating across the Atlantic carried only tourist traffic ; and the proportion of tourist class passengers would probably have been still larger if it had not been necessary to turn many applicants away due to flights having been fully booked well in advance of their date.

I.A.T.A.'s traffic accomplishments were climaxed in the special traffic conferences which have reached unanimous agreement on almost 400 resolutions—in itself a major and perhaps unique accomplishment in international co-operation. I.A.T.A. has brought into existence standard forms of tickets, baggage checks, air waybills and other documents. Conditions of carriage have been reframed and made effective and a system of standard interline agreements has been constructed. I.A.T.A. has achieved standard agency resolutions, agreements with agencies, and procedures for certification of agents on a uniform and non-discriminatory basis. Communications and reservation codes have been revamped.

I.A.T.A. has taken an aggressive interest in eliminating as much as possible of the red tape which complicates and hampers international movement by air. A co-operative campaign with I.C.A.O. has promoted state action on I.C.A.O. Facilitation Standards with a resulting considerable easement of the complications affecting the public, airlines and Governments alike.

In the technical field, I.A.T.A. has been of considerable assistance to I.C.A.O. in the drafting of this body's Standards and Recommended Practices, which set an international pattern for technical regulation of aeronautics by individual states. A body of international regulations has been set up to deal with the practical problems of operation, considerably improved in simplicity and efficiency over pre-war arrangements.

The I.A.T.A. Clearing House, operating on a dual currency basis in both sterling and U.S. dollars, was given official approval at the Second Annual Meeting and began operations in January of 1947. Set up to handle the inter-company revenue transactions of members, it offsets their balances on a monthly basis and computes the results in a simple monthly statement to each. Purely voluntary in operation, it put through $52 million worth of transactions in its first years. Today its annual turnover nudges $200 million.

An inter-clearance agreement has facilitated the settlement of interline transactions between the dense American domestic network and the International carriers. A Universal Air Travel Plan, embracing the members of I.A.T.A. and A.T.A., makes possible travel on credit. A development of the A.T.A. Travel Credit card system, it was supplemented by the I.A.T.A. Air Travel Credit to facilitate the issue of Travel Cards in countries restricting expenditure on foreign travel.

Mr. Symington's words to I.A.T.A. delegates at the 1946 General Meeting in Montreal, spoken as the organization's president and as a Canadian, offer as much of a challenge today as then :

"I call your attention to the fact that in its every word, I.A.T.A. breeds internationalism. It is an international body which must think internationally. Whatever it does should advance internationalism and that involves the abandonment of selfish nationalistic or selfish company ideas."

"But me no buts"

Or, I.A.T.A. and the Journalists

BY CASSIOPEIA, LONDON

It gave us great pleasure to read the article by the Sales Manager of British European Airways in *I.A.T.A. Bulletin* No. 17, in which he pleads "for a change of heart" in I.A.T.A.'s attitude towards the problems of the Agents. This made us hope that in some forthcoming issue we may see a supplication from a Public Relations Officer for the modification of Resolution 200 which prohibits the free carriage of journalists on international air routes except in some prescribed circumstances.

We understand that the root of the trouble is that such free travel on any form of transport is against the laws of the United States ; therefore, the U.S. airlines cannot assent ; therefore, aviation journalists everywhere must stay in their own parish.

We wonder if the United States' Government reads *The New Yorker* but there, in the issue dated January 3, 1953, it would find in black and white that the Grace Shipping Line is said to have "given round trips" to the Inca Highway not only to a quetzal-catcher* and his wife but also to a truck and trailer, a jeep, a paratrooper stove, an Army command tent and five boxes of dehydrated food.

Thus it appears that there are backwaters for the American shipping lines just as there are for the airlines. I.A.T.A.'s F.B.H.—i.e., Messrs. Feick, Butt and Hofmann—and the I.A.T.A. Enforcement Committee know as well as we do that these exist, and the members must also sometimes be aware that only by the grace of their particular gods are they sitting on the right side of the table.

Many of the P.R.O.'s have assured us that they are whole-heartedly on the side of us journalists—but—but—but . . . They prove that they want our goodwill by spending lots of money and energy in the organization of special flights on their new aircraft and routes, and we would like them to know that we appreciate their efforts. Strange though it may seem, we would willingly forego the wining and dining. We would be more than satisfied to be allowed to see the airline as the passenger sees it. We want to eat the food he eats and be "processed" as he is "processed." Then only can we say that we really know an airline.

I.A.T.A. is always saying that there is still a lot of selling to be done, and we think that we can do some of it by the articles we write. At the present time we are doing our part in spite of I.A.T.A. rather than by its aid.

The airlines, many of which are now twenty-five to thirty years old, should now be allowed to carry their own door keys. Surely it can be left to their judgment to decide who is worth carrying. We, too, want to do our share of the work of building air transport.

In the foreword to the latest *I.A.T.A. Bulletin* Sir William Hildred says that I.A.T.A.'s members should take a moral to heart—namely, that what an airline gets out of I.A.T.A. varies in direct proportion to the amount of good work it puts into it. The moral of our own little piece is a transcription of Sir William Hildred's—that what an I.A.T.A. airline gets out of an *aviation journalist* varies in direct proportion to the amount of good work it puts into *him*.

* A quetzal, it appears, is a bird of the Central American mountain forests with a metallic sheen on the feathers and long upper tail coverts. Why and how anybody catches quetzals is beyond the range of our knowledge. – *Ed.*

PILLARS OF WORLD AIR TRANSPORT

A "Who's Who" of the International Air Transport Association

(cf. "INTERAVIA, Review of World Aviation," No. 9, 1949; No. 8-9, 1950 and No. 9, 1951)

CAPITAL AND OWNERSHIP A = Authorized I = Issued O = Original * Associate Member	MANAGEMENT	AIR FLEET	PRINCIPAL ROUTES	ROUTE MILEAGE (unduplicated)
EUROPE				
AER LINGUS, Upper O'Connell Street, Dublin				
A = £5,000,000 I = £ 952,000 O = £ 100,000	E. T. McCarron (Chairman) J. F. Dempsey, General Manager Capt. J. C. Kelly-Rogers, Deputy General Manager Capt. W. J. Scott, Ops. Manager Capt. P. McCormack, Ch. Engineer	12 Douglas DC-3s 4 Bristol 170's 16 + 4 Vickers Viscounts on order	Shannon to Dublin and London; Dublin to London and provincial centres; Amsterdam, Paris, Dublin to Isle of Man and Jersey	2,902 miles 4,670 km
AERO O/Y, Finnish Air Lines, Mannerheimintie 9B, Helsinki				
A = Fmk. 60,000,000 I = Fmk. 60,000,000 O = Fmk. 50,000 73% Government	Gen. Leon. Grandell, President S. J. Ahola, Chairman Bertel Aulin, Tech. Director Adolf Nyström, Comm. Director	3 Convair 340s 9 Douglas DC-3s 12	Helsinki—Stockholm—Copenhagen—Hamburg—Düsseldorf; Helsinki—Stockholm; Turku—Mariehamn—Stockholm; domestic	3,920 miles 6,310 km
AIR FRANCE, Compagnie Nationale Air France, 2, rue Marbeuf, Paris (VIII*)				
I = Fr. 10,000,000,000 O = Fr. 120,000,000 Government	Max Hymans, Chairman Henri Ziegler, Managing Director René Briend, Asst. Man. Director Maurice Lemoine, Secretary Raymond Dupré, Technical Director	22 Lockheed Constellations 5 Lockheed Super Constellations 26 Douglas DC-4s 40 Douglas DC-3s 19 Languedocs 4 Vickers Viscounts 5 Bréguet Provences 3 De Havilland Comet 1s 124 + 5 Lockheed Super Constellations 3 D.H. Comet IIs 7 Bréguet Provences 8 Vickers Viscounts on order	N., Central, W. and E. Africa; Near, Middle and Far East; Australia; North Atlantic; New York; Montreal; Mexico City; South Atlantic; domestic in France and overseas territories	155,340 miles 250,000 km
AVIACION Y COMERCIO S. A., 33, Calle Aduana, Madrid				
A = Ptas. 100,000,000 I = Ptas. 40,000,000 Private	José Pazo Montes, President Nicolas de Gaminde Grima, Vice-President	8 Bristol 170's 4 Languedoc 12	West Coast Africa; Paris, Brussels, Amsterdam; domestic	6,727 miles 10,827 km
BEA, British European Airways, Keyline House, Ruislip, Middlesex				
A = £20,000,000 I = £15,000,000 Government	Lord Douglas of Kirtleside, Chairman P. G. Masefield, Chief Executive J. W. G. James, Director of Flight Operations A. H. Milward, Controller of Operations G. O. Waters, Traffic Director P. C. F. Lawton, Commercial Director	26 Vickers 700 Viscounts 20 DH Elizabethans 30 Vickers Vikings 38 Douglas Pionairs (DC-3) 12 Douglas DC-3 Freighters 12 DH.89 Dragon Rapide 1 Bristol Freighter + 6 Helicopters 139 12 Vickers 800 Viscounts on order	London to 33 points in Continental Europe; Tripoli, Benghazi, Cairo; domestic, including the Channel Islands	16,398 miles 26,390 km
BOAC, British Overseas Airways Corp., Airways House, Gt. West Road, Brentford, Middlesex				
A = £60,000,000 I = £33,817,262 Government	Sir Miles Thomas, Chairman Whitney W. Straight, Deputy Chairman Major J. R. McCrindle, Adviser, International Affairs Sir Victor H. Tait, Ops. Director K. G. Granville, Sales Director	7 De Havilland Comet Is 22 Canadair Argonauts 9 Handley Page Hermes 7 Lockheed Constellation 049's 5 Lockheed Constellation 749's 10 Boeing Stratocruisers 6 Avro York Freighters 66 + 26 Bristol Britannias 12 De Havilland Comet IIs on order	London to Middle and Far East, Australia, Africa, the Americas and the Caribbean	84,875 miles 136,593 km
CSA, Ceskoslovenske Aerolinie, 1, Namesti Republiky, Prague				
State operation	Leopold Thurner, Director General O. Ruzicka, Deputy Director General Major J. Hubacek, Ops. Manager	Douglas DC-3s Ilyushin IL-12s	European capitals (except London); domestic	6,388 miles 10,280 km
FLUGFELAG ISLANDS H. F. (Iceland Airways), Reykjavik				
A = I.Kr. 6,000,000 I = I.Kr. 2,800,000 O = I.Kr. 25,000	Gudmundur Vilhjalmsson, Chairman Orn O. Johnson, General Manager J. R. Snorrason, Operations Manager	1 Douglas DC-4 3 Douglas DC-3s 1 Convair PBY-5 1 Convair PBY-5A 1 Grumman JRF-5A 1 De Havilland Dragon Rapide 1 Norduyn Norseman	Reykjavik to: Oslo, Copenhagen, London, Glasgow; Domestic to 20 points	6,746 miles 10,856 km
HUNTING AIR TRANSPORT Ltd., 5, Fitzhardinge Street, Portman Square, London W. 1				
A = £100,000 I = £100,000 Private	M. H. Curtis, Managing Director E. H. Baker, Secretary L. B. Greensted, Ops. and Technical Manager	8 Vickers Vikings 5 Douglas DC-3s 3 Avro Yorks 16 + 3 Vickers Viscount on order	London to E. Africa; Newcastle—Amsterdam—Düsseldorf; Newcastle—Paris; domestic	11,809 miles 19,004 km
IBERIA, Compania Mercantil Anonima de Lineas Aereas, Plaza de Canovas del Castillo 4, Madrid				
A = Ptas. 90,000,000 I = Ptas. 35,400,000 O = Ptas. 12,000,000 Government	Jesus Rubio Paz, President Cesar Gomez Lucia, Director and General Manager Jose Ma. Ansaldo, Sub-Dir. Flight Operations Chief	16 Douglas DC-3s 6 Douglas DC-4s 4 Bristol 170s 3 Lockheed Super Constellations 11 Misc. 40	Madrid to London, Paris, Geneva, Frankfurt, Rome, Lisbon, Havana, Buenos Aires, Mexico City, N. and W. Africa; Canary Islands; Brazil; domestic	33,549 miles 53,993 km
JAT, Jugoslovenske Aerotransport, Bircaninova 1/111, Belgrade				
State operation	Vukovie Drago, General Manager Rajcevic Velisa, Commercial Manager Nikolic Dragomir, Asst. Commercial Manager Andjelkovic Ratomir, Ops. Manager	20 Douglas DC-3s	Belgrade and Zagreb to Zurich, Munich, Frankfurt, Graz, Linz, Athens; domestic	1,274 miles 2,050 km
KLM, Royal Dutch Airlines (Koninklijke Luchtvaart Maatschappij), Raamweg, The Hague				
A = Dutch Guilders 200,000,000 I = Dutch Guilders 122,954,000 O = Dutch Guilders 5,100,000	Dr. A. Plesman, President F. Von Balluseck, Exec. V. P. (Traffic) F. Besançon, Exec. V. P. (Production) M. J. Van der Ploeg, Exec. V. P. (Accts) L. H. Slotemaker, Exec. V. P. (Foreign)	20 Douglas DC-3s 10 Douglas DC-4s 6 Douglas DC-6s 1 Douglas DC-6A 7 Douglas DC-6Bs 15 Lockheed Constellations 11 Convair Liner 240s 4 Lockheed Super Constellations 74 + 1 Douglas DC-6A 9 Lockheed Super Constellations 12 Convair Liner 340s on order	European; Amsterdam to Canada, U.S.A., Mexico, Caribbean, South America, South Africa, Near East, Middle East, Far East, Australia	129,910 miles 209,070 km
LAI, Linee Aeree Italiane S.p.A., Via del Tritone 132, Rome				
O = Lit. 10,000,000 I = Lit. 500,000,000 40% TWA 60% Government and Private	Prince Marcantonio Pacelli, President Comm. Richard Mazzarrini, Vice-President Gen. Luigi Gallo, Director General Comm. Antonio Nervi, Managing Director	3 Douglas DC-6s 3 Convairs 20 Douglas DC-3s 26	To USA, Egypt, Israel, Tunisia, Greece, Turkey, Spain, Germany, France, Switzerland; domestic	15,665 miles 25,211 km
LOT, Polskie Linie Lotnicze, Lot Building, rue Hoza 39, Warsaw				
State operation	Sergiusz Minorski, General Director Mieczyslaw Rolski, Administrative and Comm. Director Anatol Arciuch, Technical Director	Ilyushin IL-12s Li-2s	Warsaw to Berlin, Brussels, Bucharest, Budapest, Copenhagen, Paris, Prague and Stockholm; domestic	5,511 miles 8,868 km

SABENA, Société Anonyme Belge d'Exploitation de la Navigation Aérienne, rue Royale 145, Brussels

I = Fr.b. 300,000,000 O = Fr.b. 6,000,000 50% Government 50% Private	Gilbert Périer, President Gaston Claeys, Managing Director Willem Deswarte, General Manager Léon Schoevaerts, Commercial Manager Anselme Vernieuwe, Ops. Manager	6 Douglas DC-6Bs 5 Douglas DC-6s 7 Douglas DC-4s 20 Douglas DC-3s 11 Douglas C-47s 6 Convair Liners 4 D.H. Doves + 6 helicopters 59 2 Douglas DC-6Bs 2 Douglas DC-6As on order	34 cities in Europe; New York, Cairo, Tel Aviv, Belgian Congo, South Africa; 40 centres in the Belgian Congo and in neighbouring African countries	49,710 miles 80,000 km

SAS, Scandinavian Airlines System, Head Office: Stockholm 40, Sweden (Uniting DNL = Norwegian Airlines – DDL = Danish Airlines – ABA = Swedish Airlines)

= Kr. 157,000,000 50% Private 50% Danish, Norwegian and Swedish Government	Per A. Norlin, President Per M. Backe, Executive Vice-President Viggo J. Rasmussen, Executive Vice-President	8 Douglas DC-6Bs 12 Douglas DC-6s 7 Douglas DC-4s 9 Douglas DC-3s 6 Saab Scandias 2 Junkers Ju 52s 44 + 6 Douglas DC-6Bs on order	European; Near and Middle East; Scandinavia to New York, to Santiago de Chile, to Tokyo, to Johannesburg; domestic	64,214 miles 103,343 km

SWISSAIR, Swiss Air Transport Co. Ltd., Hirschengraben 84, Zurich

A = Sw.Fr. 14,000,000 O = Sw.Fr. 20,000,000 30% Government 70% Private	Rudolf Heberlein, Chairman of the Board Walter Berchtold, President Heinz Haas, Executive Vice-President Eugen Groh, Vice-President Finances and Admin. L. Ambord, Vice-President Traffic and Sales	4 Convair Liners 3 Douglas DC-6Bs 13 Douglas DC-3s 3 Douglas DC-4s 3 DH 89s 26 + 3 Douglas DC-6B on order	Basel, Berne, Geneva and Zurich to 26 towns in Europe and the Middle East; to New York	24,000 miles 38,625 km

TAE, Greek National Flag Airline, 12, Merlin Street, Athens

I = Drs. 50,000,000,000 divided into 100,000 shares	C. Iliaskos, Chairman George Reppas, Managing Director	1 Douglas DC-4 16 Douglas DC-3s 1 Fairchild 18	Athens to Alexandria, Istanbul, Rhodes, Crete, Rome, Paris and London; domestic	7,734 miles 12,448 km

TAI, Compagnie de Transports Aériens Intercontinentaux, rue de la Paix 23, Paris (II[e])

I = Fr. 100,000,000 O = Fr. 20,000,000 Private	Paul Bernard, President Gen. G. Fayet, Director General Wilmot Roussel, Deputy Director General M. Gaffie, Commercial Director	3 Douglas DC-4s 3 Douglas DC-6Bs 6	Paris to: Madagascar—Cameroons—Gabon—Abidjan—Casablanca; Saigon	20,288 miles 32,651 km

TAP, Transportes Aéreos Portugueses, rua Braamkamp 2, Lisbon

A = Esc. 120,000,000	Francisco de Mello e Castro, President Brig. Carlos Marques Magalhaes, Director General	3 Douglas DC-4s 6 Douglas DC-3s 9	Lisbon to Porto, Madrid, Tangier, Casablanca, S. Tomé, Luanda, London, Paris	9,544 miles 15,359 km

UAT, Union Aéromaritime de Transport, boulevard Malesherbes 19, Paris (VIII[e])

I = F.fr. 10,000,000 O = F.fr. 400,000	Louis Vidal, Managing Director Jean Combard, Director General Robert Loubry, Director General Antoine Veillard, Deputy Director Henri Jalaber, Commercial Director	3 De Havilland Comet 1As 4 Douglas DC-4s 3 Douglas DC-3s 4 DH Herons 14	Paris to North Africa, French West Africa, French Equatorial Africa, the Far East	32,300 miles 52,000 km

USA AND CANADA

AA, American Airlines, Inc., 100, Park Avenue, New York 17, N. Y.

Private	C. R. Smith, President G. J. Brandewiede, Vice-President (Maint. & Supply) R. E. S. Deichler, Vice-President Sales Lawrence G. Fritz, Vice-President Ops. G. K. Griffin, Vice-President Personnel William Littlewood, Vice-President (Engineering)	13 Douglas DC-4 Airfreighters 1 Douglas DC-4 49 Douglas DC-6s 17 Douglas DC-6Bs 78 Convairs 158	U.S. domestic, incl. Boston, New York, Philadelphia, Washington, Chicago and Detroit to San Francisco and Los Angeles. Also to Canada and Mexico City	10,825 miles 17,080 km

BRANIFF AIRWAYS, Inc., Love Field, Dallas 19, Texas

I = $2,500,000 Private	T. E. Braniff, President Charles E. Beard, Exec. Vice-President Ray C. Sharder, Vice-President Ops.	32 Douglas DC-3s 8 Douglas DC-4s 9 Douglas DC-6s 26 Convair 340s 75	To Central and South American countries; Domestic in central USA and Texas	14,533 miles 23,388 km

COLONIAL AIRLINES Inc., 230, Park Avenue, New York 17, N. Y.

I = 515,600 shares Private	B. T. Dykes, President T. J. Dunnion, Ass't to President L. O. Cameron, Vice-President Secy R. H. Herrnstein, Vice-President, Traffic	8 Douglas DC-3s 4 Douglas DC-4s 12	Eastern United States to Canada and Bermuda	2,967 miles 4,774 km

CPA, Canadian Pacific Air Lines, Ltd., Vancouver

A = $2,000,000 I = $1,800,000 Wholly-owned subsidiary of the Canadian Pacific Railway Company.	G. W. G. McConachie, President R. W. Ryan, Vice-President F. M. McGregor, Man. Overseas Lines R. B. Phillips, Man. Domestic Lines H. B. Main, Gen. Traffic Man.	4 Douglas DC-6Bs 5 Douglas DC-4s 15 Douglas DC-3s 5 Convair 340s 2 Convair PBYs 2 Noorduyn Norsemen 33	Vancouver, San Francisco, Tokyo, Hong Kong; San Francisco, Honolulu, Fiji, New Zealand and Australia	24,535 miles 39,485 km

DELTA-C&S AIR LINES Inc., Atlanta Municipal Airport, Atlanta, Georgia

Private	Carleton Putnam, Chairman of the Board C. E. Woolman, President and General Manager Laigh C. Parker, Vice-President, Traffic and Sales Charles H. Dolson, Vice-President, Operations	Douglas DC-7s Convair 340s Douglas DC-6s Douglas DC-3s Lockheed Constellations	Middle West and Southern States of the U.S.A.	6,400 miles 10,300 km

*** EAL,** Eastern Air Lines, 10, Rockefeller Plaza, New York 20, N. Y.

A = 5,000,000 shares, Par value $1.00 I = 2,478,601 shares stated value $1.25	E. V. Rickenbacker, Chairman Thomas F. Armstrong, President Paul H. Brattain, First Vice-President Sidney L. Shannon, Vice-President, Operations	14 Lockheed Super Constellations 20 Lockheed Constellations 11 Douglas DC-4s 60 Martin 404s 1 Douglas DC-3 106	New York—Mexico City; New York—San Juan; domestic services in Eastern states	12,757 miles 20,530 km

NATIONAL AIRLINES, Inc., Aviation Building, 3240 N. W. 27th Ave., Miami 42, Fla.

I = $1,000,000 Private	G. T. Baker, President Walter Sternberg, Vice-President, Sales E. J. Kershaw, Vice-President, Operations John L. Morris, Vice-President	11 Lockheed Lodestars 3 Douglas DC-4s 7 Douglas DC-6s 6 Douglas DC-6Bs 27	New York—Miami—Havana; domestic in Middle West, S.W. and Western States	2,829 miles 4,551 km

NORTHWEST AIRLINES Inc., 1885 University Ave., St. Paul 1, Minnesota

A = $45,000,000 I = $17,586,705 Private	Croil Hunter, Chairman of the Board Harold R. Harris, President Malcolm S. McKay, Exec. Vice-President E. I. Wyatt, Vice-President and Comptroller F. C. Judd, Vice-President, Operations	8 Douglas DC-3s 25 Douglas DC-4s 10 Boeing Stratocruisers 43 + 6 Lockheed Super Constellations 4 Douglas DC-6Bs on order	New York—Seattle—Honolulu; New York to Alaska, Aleutians, Japan, China and Philippines; Canada	16,792 miles 27,023 km

PAA, Pan American World Airways System, 135 East 42nd Street, New York, N. Y.

A = $68,972,871 I = $34,000,000 O = $ 3,378,846 Private	Juan T. Trippe, President John C. Leslie, Vice-President, Administration W. G. Lipscomb, Vice-President, Traffic and Sales H. J. Friendly, Vice-President and Gen. Counsel	28 Boeing Stratocruisers 18 Douglas DC-6Bs 14 Lockheed Constellations 45 Douglas DC-4s 14 Convair Liners 10 Douglas DC-3s 129	Atlantic to Western and Central Europe, Middle and Far East, Africa; Pacific: San Francisco to Honolulu, Tokyo, Manila, Calcutta and San Francisco to Auckland and Sidney; Alaska. Latin America: complete services in Central and South America	62,016 miles 99,805 km

PANAGRA, Pan American-Grace Airways, Inc., 135 East 42nd Street, New York 17, N. Y.

I = $4,750,000 O = $1,000,000 50% PAA 50% W.R. Grace & Co.	Andrew B. Shea, President Douglas Campbell, Vice-President and Gen. Manager Erwin Balluder, Vice-President T. J. Kirkland, Vice-President, Operations K. A. Lawder, Vice-President and Comptroller	10 Douglas DC-3s 3 Douglas DC-4s 6 Douglas DC-6s 2 Douglas DC-6Bs 21	Miami and Panama Canal Zone to Ecuador, Peru, Bolivia, Chile, Argentina. Local services in Ecuador and Bolivia	8,878 miles 14,287 km

TCA, Trans-Canada Air Lines, International Aviation Building, 1080 University Street, Montreal, Quebec

I = $25,000,000 O = $ 5,000,000 Government	G. R. McGregor, President W. F. English, Vice-President (Operations) T. G. Wood, Vice-President (Traffic) D. I. Grant, Secretary W. S. Harvey, Comptroller	23 Canadair North Stars 27 Douglas DC-3s 50 + 8 Lockheed Super Constellations 15 Vickers Viscounts 3 Bristol freighters on order	Transcontinental, Transatlantic to U.K., Paris and Düsseldorf, Montreal and Toronto to Florida, Bermuda and West Indies	18,000 miles 28,970 km

TWA, Trans World Airlines, Inc., 630, Fifth Avenue, New York 20, N. Y.

A = $20,000,000 I = $16,650,965	Warren Lee Pierson, Chairman R. S. Damon, President	68 Lockheed Constellations 10 Lockheed Super Constellations 52 Martin 404s 13 Douglas DC-4s 10 Douglas DC-3s 153	Transcontinental USA; Europe; Africa; Asia	33,000 miles 53,110 km

UAL, United Air Lines, Inc., 5959 S. Cicero Ave, Chicago 38, Illinois

I = $153,391,000 O = $ 7,953,677	W. A. Patterson, President Otis E. Kline, Exec. Vice-President J. A. Herlihy, Vice-President, Engin. and Maintenance D. R. Petty, Vice-President, Flight Operations	53 Douglas DC-3 11 Douglas DC-4 12 Douglas DC-4 (cargo) 43 Douglas DC-6 19 Douglas DC-6B 6 Boeing Stratocruisers 20 Convair 340s 164	U.S. domestic and transcontinental; Los Angeles and San Francisco to Honolulu	10,783 miles 17,352 km

LATIN AMERICA

AEROLINEAS ARGENTINAS, Buenos Aires

State-owned	Dirk Wessels van Leyden, Director General Rodolfo Raffaelle, Traffic Director Mario Perez, Administration Director Juan Lotto, Commercial Director Angel R. Vaccari, Operations Director	6 Douglas DC-6s 5 Douglas DC-4s 17 Douglas DC-3s 5 Convairs 6 Short Sandringhams 1 Beechcraft 40	Buenos Aires to: United States, Europe, Santiago de Chile, Bolivia, Brazil, Montevideo, Paraguay	34,515 miles 55,548 km

AEROVIAS GUEST, S. A., Paseo de la Reforma, 95, Mexico, D. F.

Ps. 5,000,000 Private	Winston Guest, President George L. Monteiro, Exec. Vice-President John R. Joye, Director, Traffic and Sales Durston G. Richardson, Director of Operations	3 Douglas DC-4s	Mexico City to Paris via Miami, Bermuda, Azores, Lisbon and Madrid; Mexico City to Miami; domestic	5,726 miles 9,263 km

AVIANCA, Aerovias Nacionales de Colombia S. A., Bogota

A = $9,675,000 I = $9,622,295 O = $ 800,000 48.2% PAA 51.8% Private	Gregorio A. Obregon P., President and General Manager Jorge A. Gonzalez P., Executive Vice-President Fernando Carrizosa H., Vice-President, Financial H. Max Healey, Vice-President, Commercial	27 Douglas DC-3s 10 Douglas DC-4s 2 Lockheed Constellations 1 Convair PBY-5A 5 Curtiss C-46s 45	Colombia to: Lisbon, Madrid, Paris, Frankfurt and Hamburg; Kingston, Miami and New York; Panama; Ecuador; domestic	21,977 miles 35,370 km

CRUZEIRO, Servicos Aereos Cruzeiro do Sul Ltda., Avenida Rio Branco 128, Rio de Janeiro

I = Cr. 20,000,000 O = Cr. 100,000 Private	Dr. Jose Bento Ribeiro Dantas, President Cicero Leite, Secretary J. Q. V. de Carvalho, Commercial Otto Breyer, Traffic Manager	38 Douglas DC-3s 6 Misc. 44 + 4 Convair 340s on order	Rio de Janeiro to Caracas; United States; domestic and other South American countries	20,442 miles 32,897 km

CUBANA, Compania Cubana de Aviacion, S. A., 23 No. 105, Vedado, Havana

I = Ps. 1,000,000 52% PAA 48% Private	Sergio I. Clark, President and General Manager Jorge Barroso, Vice-President Warren A. Pine Jr. Vice-President	6 Douglas DC-3s 2 Douglas DC-4s 8	Havana—Miami; Havana—Azores—Lisbon—Madrid; domestic	8,473 miles 13,634 km

LAN, Linea Aerea Nacional, Los Cerillos, Santiago de Chile

A = $ch. 233,000,000 O = $ch. 5,618,564 Government	Arturo Merino Benitez, Executive Vice-President Marcial Arredondo, Technical Manager Alfonso Cuadrado, Chief Operations Oscao Gonzalez, Chief Engineer	4 Lockheed Lodestars 3 Lockheed Electras 8 Douglas DC-3s 4 Martin 202s 12 DH Doves 1 Beech Bonanza 32	Santiago—Buenos Aires; Magellanes, Punta Arenas; Valparaiso; Arica, etc.	4,002 miles 6,440 km

LAV, Linea Aeropostal Venezolana, Caracas

I = Bs. 48,000,000 Government	Lt. Col. G. Pacanins, President Capt. F. Lagarde, Supt. Production Capt. J. G. Lopez, Ops. Manager (National) M. S. Mendoza, Ops. Manager (International)	21 Douglas DC-3s 2 Curtiss C46s 2 Martin 2-0-2s 4 Lockheed Constellations 1 Lockheed Lodestar 30	Caracas to New York; Caracas—Santa Maria Azores—Lisbon—Madrid—Rome; Caracas to other points in South America; domestic	16,462 miles 26,493 km

PANAIR DO BRASIL S. A., Edificio Panair, Aeroporto Santos-Dumont, Caixa Postal 694, Rio de Janeiro

A = Cr.100,000,000 O = Cr. 500,000 48% PAA 52% Private	Dr. Paulo Sampaio, President Dr. Cauby C. Araujo, General Manager Erik de Carvalho, Exec. Asst. Dr. Alberto Torres Filho, Secretary	6 Lockheed Constellations 5 Convair PBY-5As 17 Douglas DC-3s 28 + 4 Comet IIs on order	Rio de Janeiro—Recife—Dakar—Lisbon—Zurich; Stuttgart, Frankfurt, Hamburg, Rome, Madrid, Paris, London; Rio de Janeiro—Santiago de Chile	27,667 miles 44,525 km

VARIG S. A., Empresa de Viacao Aerea Rio Grandense, Porto Alegre, Brazil

I = Cr. 30,000,000 O = Cr. 1,000,000 11% Government 89% Private	Rubem M. Berta, President Goetz G. Herzfeldt, Technical Director	2 Lockheed Electras 23 Douglas DC-3s 13 Curtiss C-46s 38	Rio de Janeiro to Natal and to Buenos Aires; Porto Alegre to Rio de Janeiro; domestic	7,930 miles 12,688 km

AFRICA

CAA, Central African Airways Corp., Salisbury, S. Rhodesia

A = £880,000 Government 50% S. Rhodesia 35% N. Rhodesia 15% Nyasaland	Col. Sir Ellis Robins, Chairman P. J. Wimbush, General Manager K. H. Greager, Chief Engineer R. A. R. Wieland, Commercial Manager R. A. Bourlay, Operations Manager	9 Vickers Vikings 6 D.H. Beavers 6 Douglas DC-3s 21	Central Africa; Central Africa to United Kingdom, to South Africa, to Kenya, to Tanganyika and to Portugese East Africa	12,320 miles 19,830 km

COMPAGNIE GÉNÉRALE DE TRANSPORT AÉRIEN Air Algérie, boulevard Saint-Saëns 46, Algiers

I = F.fr. 470,000,000 The capital will be increased to 1,000 million Fr. frs. in the course of this year	J. Richard Deshais, President Director General L. Adida, Deputy Director General Colonel J. Soufflet, Deputy Director to the President	3 Douglas DC-4s 3 Douglas DC-3s 6	Algiers to: Paris, Marseilles, Toulouse, Lyons, Perpignan, Clermont-Ferrand, Geneva, Basel/Mulhouse, Palma, Marseilles, Philippeville, Ajaccio	

DETA, Divisao de Exploracao des Transportes Aéreos, Rua Araujo 103, Lourenco Marques

State operation	Arnaldo Pacheco Pereira Leite, Director General Lt. Col. Alvaro Herculano Pinho da Cunha, Chief Manager Abel Neves de Azevedo, Chief Engineer Carlos Borges Delgado, Traffic Manager	3 Douglas DC-3s 3 Lockheeds 2 Junker 52s 6 DH Doves 4 DH Dragon Rapides 18	Lourenco Marques—Johannesburg and Durban; Beira—Salisbury; domestic	2,695 miles 4,336 km

DTA, Divisao de Exploracao dos Transportes Aereos, Caixa Postal 79, Luanda

State operation	Luciano J. Ros, Secretary General Albano dos Santos, Comptroller Antonio dos Santos, Chief Accountant Guilherme da Costa Carvalho, Traffic Manager	8 De Havilland Dragon Rapides 5 Beechcraft D-18s 5 Misc. 18	Domestic	2,769 miles 4,455 km

EAAC, East African Airways Corporation, Airways Terminal, Sadler Street, Nairobi

A = £221,500 O = £ 50,000	Sir Alfred Vincent, Chairman M. Sorsbie, General Manager A. V. Gill, Secretary and Chief Accountant S. Broad, Administration Manager	9 Douglas DC-3s 3 DH Dragon Rapides 8 Macchi MB. 320s 20	Services in Kenya, Uganda, Tanganyika, Zanzibar: to Durban	19,729 miles 31,749 km

MISRAIR, Almaza Airport, Heliopolis, Cairo

O = £E. 20,000 Private	Mohamed Roushdy, Managing Director and Gen. Manager Gamal El Din Kotby, Deputy General Manager Abdel Hamid Mokbel, Secretary General	4 Languedocs 7 Vickers Vikings 2 Beechcrafts 1 Miles Gemini 14	International services throughout Middle East; Cairo to Rome, Naples, Geneva, Nice, London; domestic	11,698 miles 18,826 km

SAA, South African Airways, South African Railways and Harbour and Airways Administration, Johannesburg

State Control	Maj. Gen. C. J. Venter, Chief Airways Manager J. D. T. Louw, Chief Supt. (Airways) R. Madeley, Supt. (Flying) F. W. Bailey, Supt. (Maintenance) D. Beaton, Supt. (Commercial)	4 Lockheed Constellations 7 Douglas DC-4s 3 Douglas DC-3s 11 Lockheed Lodestars 25	Johannesburg to Europe and London, via Central Africa and the Nile Valley; Johannesburg—Bulawayo; Johannesburg—Lourenco Marques	25,964 miles 41,785 km

WAAC, West African Airways Corporation, Airways House, Lagos Airport, Nigeria

State operation	Sir Hubert Walker, Chairman E. P. Hessey, General Manager D. Malcolm Brown, Commercial Manager T. C. Hardy, Secretary and Chief Accountant J. Woodhouse, Chief Engineer	10 DH Doves 3 Bristol 170s 2 Bristol Freighters 6 HP Marathons 21	Nigeria, the Gold Coast, Gambia, Sierra Leone, French West Africa, and Anglo—Egyptian Sudan	9,347 miles 15,041 km

NEAR AND FAR EAST

AIR CEYLON Ltd., P. O. Box 692, 3 Lotus Road, Fort, Colombo 1.

A = Rs. 15,000,000 51% Austr. Nat. Airways 49% Government	W. W. Doyle, General Manager E. R. Knight, Traffic Manager W. A. E. Molamure, Chief Engineer	2 Douglas DC-4s 2 Douglas DC-3s 4	Domestic	

AIR-INDIA INTERNATIONAL CORP., Mahatma Gandhi Road, Bombay, 1

State-owned	J. R. D. Tata, Chairman B. K. Patel, General Manager A. C. Gazdar, Operations Manager S. K. Kooka, Traffic Manager	4 Lockheed Constellations	Bombay—London via Cairo, Rome, Düsseldorf, Geneva, Paris; Bombay—Nairobi via Karachi and Aden; Bombay—Delhi; Bombay—Calcutta	10,143 miles 16,323 km

AIR LIBAN, Esseyli Building, Assour Square, Beirut

O = £L. 500,000	Basile Meguerdiche, Director General J. P. Serrant, Director, Commercial Service	4 Douglas DC-3s 1 Languedoc 5	Middle East	5,938 miles 9,556 km

CYPRUS AIRWAYS Ltd., 18, Homer Avenue, Nicosia

I = £125,000 O = £125,000	J. Anderson Vick, Managing Director Bryan G. Cooper, Secretary Derek J. Platt, Commercial Manager	6 Douglas DC-3s	Throughout the Middle East; Athens and Rome	6,900 miles 11,104 km

EL-AL, Israel Airlines, Ltd., 31 Rothschild Blvd., Tel-Aviv

A = £11,210,000 I = £11,210,000 62.8% Government 37.2% Private Institutions	Louis A. Pincus, Managing Director Yoel Palgi, Deputy Managing Director H. Cranko, Director of Finance and Administration Abraham Rywkind, Commercial Manager	3 Constellations 6 C-46s 9	New York, London, Paris, Rome, Athens, Zurich, Vienna, Istanbul, Nicosia, Nairobi and Johannesburg	18,824 miles 30,293 km

GARUDA INDONESIAN AIRWAYS N. V., 15, Djalan Nusantara, Djakarta (Indonesia)

O = 30,000,000 Rupiah I = 90,000,000 Rupiah 50% Government 50% KLM	Dr. E. van Konijnenburg, Managing Director D. K. van Houten, Asst. Managing Director C. A. Mochtar, Asst. Managing Director	8 Convair 240s 9 Douglas DC-3s passenger version 12 Douglas DC-3s cargo version 6 Convair Catalinas 35	Domestic routes	17,151 miles 27,602 km

IRAQI AIRWAYS, Baghdad, West

O = I.D. 77,500 State operation	Akram Mushtaq, Director General Midhat Abdul Rahman, Mgr.-Airport Baghdad Ali Fuad Bey, Chief Airport Controller-Airport Basra	3 Vickers Vikings 1 DH Dove 4	Baghdad to Basra, Kuwait, Bahrein, Cairo, Damascus, Beirut and Teheran	3,316 miles 5,336 km

MALAYAN AIRWAYS Ltd., c/o Mansfield & Co., Ocean Building, Collier Quay, Singapore

A = M$5,000,000 I = M$2,500,000	F. L. Lane, Chairman Capt. R. P. Mollard, Managing Director J. Skeldon, Manager S. H. Edwards, Engineer Supt.	11 Douglas DC-3s 2 DH 89 Rapides 13	Singapore to: Malaya, Borneo and Sarawak; Bangkok, Saigon, Medan and Palembang	4,763 miles 7,665 km

PAL, Philippine Air Lines, Inc., M.R.S. Building, Plaza Cervantes, Manila

I = P. 12,500,000 48.57% Government 51.43% Private	Placido L. Mapa, Vice-Chairman Andres Soriano, President A. M. MacLeod, First Vice-President	3 Douglas DC-6s 2 Douglas DC-6Bs 29 Douglas DC-3s 4 Noorduyn Norsemen 6 Convair 340s 44	Manila—San Francisco; Pacific Islands; Bangkok—Calcutta—Karachi—Tel Aviv—Rome—Zurich—Hamburg—London—Madrid	25,045 miles 40,306 km

AUSTRALIA AND NEW ZEALAND

***ANA,** Australian National Airways Pty. Ltd., 390, Flinders Street, Melbourne

O = £A. 500,000 Private	I.N. Holyman, Managing Director J. O. Declerck, Secretary and Finance Manager F. Kowarzi, Asst. General Manager J. Stubbs, Maintenance Supt.	9 Douglas DC-4s 27 Douglas DC-3s 3 Bristol 170s 39	Overseas contractors for Air Ceylon: Singapore, Colombo, Bombay, Karachi, Tel Aviv, Rome, London; domestic	

BCPA, British Commonwealth Pacific Airlines Ltd., Sydney

O = £A. 1,000,000 50% Austr. Government 30% N.Z. Government 20% U.K. Government	G. P. N. Watt, Chairman Capt. A. A. Barlow, General Manager Capt. J. W. Bennett (Director of Operations) E. V. Wall, Traffic and Sales Manager	4 Douglas DC-6s	Sydney or Auckland to Fiji, Honolulu, San Francisco, Vancouver	8,423 miles 13,555 km

NZNAC, New Zealand Airways Corp., Wellington, C. 1

A = £NZ. 1,200,000 Government	Air Vice-Marshal Sir Leonard Isitt, Chairman Capt. J. J. Busch, Gen. Man. and Chief Executive R. C. Gardiner, Ch. Administration Officer H. D. Yates, Traffic Manager D. W. Johnston, General Services Manager	2 Douglas Freighters 19 Douglas DC-3s 6 DH Dominies 3 DH Moths 4 DH Herons 34	Auckland—Fiji; Western Samoa—Rarotonga; domestic	3,608 miles 5,806 km

QANTAS EMPIRE AIRWAYS Ltd., Shell House, 2, Carrington Street, Sydney, N.S.W.

A = £A. 5,000,000 I = £A. 5,000,000 O = £A. 120,000 Government	Sir Wilmot Hudson Fysh, Chairman C. O. Turner, General Manager Capt. R. J. Ritchie, Controller, Tech. Development Capt. W. H. Crowther, Operations Manager C. W. Nielson, Commercial Manager	7 Lockheed Super Constellations 6 Lockheed Constellations 5 Douglas DC-4s 12 Douglas DC-3s 4 DH Drovers 4 Short Sandringham flying boats 2 Convair Catalina flying boats 40	Sydney to London; South Africa; Japan; New Guinea	61,501 miles 98,976 km

***TAA,** Trans-Australia Airlines (Australian National Airlines Commission), 339, Swanston Street, Melbourne, Victoria

A = £A. 4,370,000	G. P. N. Watt, Chairman G. Packer, Vice-Chairman L. J. Brain, General Manager J. L. Watkins, Director of Engineering J. Chapman, Director of Operations	5 Convair Liners 4 Douglas DC-4s 24 Douglas DC-3s 4 DH Drovers 4 DH Dragons 41	Domestic including Tasmania	23,921 miles 54,589 km

TEAL, Tasman Empire Airways Limited, Auckland, C. 1

A = £750,000 I = £750,000 O = £500,000 50% N.Z. Government 30% Austr. Government 20% British Government	Sir Leonard Isitt, Chairman G. N. Roberts, General Manager J. W. Veale, Asst. General Manager K. A. Brownjohn, Operations Manager G. B. Bolt, Chief Engineer	4 Mk. IV Short Solents 1 Mk. III Short Solent 5	Auckland—Sydney; Wellington—Sydney; Christchurch—Melbourne; Auckland—Tahiti	7,797 miles 12,547 km

View from a *North Star* of T.C.A. flying over the Rocky Mountains.

I.A.T.A.'s CANADIAN HOSTS—I

Fifteen years of T.C.A. progress

Fifteen years ago last August, Trans-Canada Air Lines started significant experimental flights between the western and eastern parts of Canada with small Lockheed *Electra* twin-engined transports. Up to this time Canada was six days wide by a railway specifically built to knit together provinces which, according to natural geographical and economic factors, tended to sever themselves from each other. Now Canada's 3,000 miles of breadth is cut down by T.C.A. to ten hours travelling time.

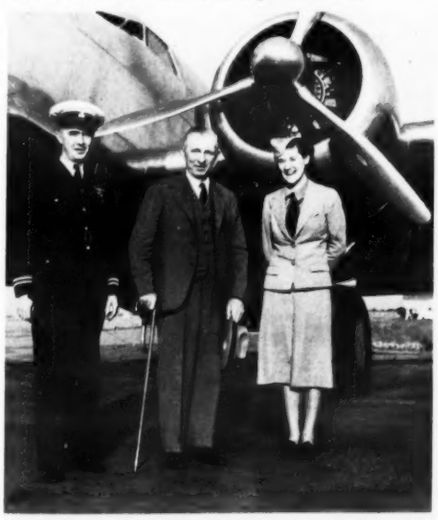
Today T.C.A. is one of the world's leading airlines, spanning Canada from sea to sea, linking the Old World with the New, and stretching south to the Caribbean and to Bermuda. Next year it will be the first airline in North America to operate turbojet transports (Vickers *Viscounts*).

T.C.A. has done good work for Canada inasmuch as it has fostered a new sense of nationhood by making its citizens more accessible to each other. In addition, it has opened up international markets and travel possibilities not only for Canadians but for other nationalities as well. More and more goods of a perishable or urgent nature are moving by air. Furthermore, its air fleet and trained personnel form an important factor in Canada's national defence.

In these 15 years of progress T.C.A.'s route mileage has increased from slightly over 100 to almost 19,000 miles ; passenger-mileage from 60,000 to 654,000,000 ; commodity ton-miles from 9 to 7,000,000 ; mail ton-miles from 875 to 4,843,000 ; system revenues from $16,279 to $55,057,000. Last year, the airline, for the first time in its history, carried over a million passengers. The volume of passenger transportation rose by 20 per cent, while air cargo and air express traffic increased by 30 per cent and mail volume by 8 per cent.

More than 100 flights are scheduled daily over T.C.A.'s routes. Transcontinental flights from St. John's, Newfoundland, to Victoria, B.C., and an inter-city network which feeds into the mainline route have made air trans-

Left : Gordon R. McGregor, former Battle of Britain pilot, is the President of Trans Canada Air Lines. On October 5th, 1953, he assumed the Presidency of I.A.T.A. for one year. *Right :* Hubert W. Seagrim, General Manager, Operations.



In 1938 T.C.A. began operating Lockheed 14H twin-engined transports and made its first east-west experimental flights. The picture shows S. J. Hungerford, first T.C.A. President, with pilot Walter W. Fowler and Stewardess Lucille Garner, posing before one of the new L-14H's at Vancouver in September 1938.

On its southern routes, T.C.A. operates to Tampa (Fla.), Bermuda and points in the Caribbean. The photo shows a T.C.A. *North Star* at Tampa International Airport, Florida.

After the war T.C.A. standardized its fleet on DC-3s for short haul and Canadair-Four *North Stars* for longer-range services. Above, a North Star.

T.C.A. has launched a new equipment programme. Scheduled for delivery next year are eight Lockheed 1049C *Super Constellations* for service on the Atlantic.

Another point on T.C.A.'s procurement schedule consists of 15 Vickers *Viscount* turboprop aircraft which will operate on the shorter-range domestic routes and services to the U.S.A.

For short-haul cargo services, T.C.A. has three Bristol *Freighters* on order.

portation available to most important Canadian centres. Trans-border routes serve many major cities in the United States, including Boston, New York, Chicago, Cleveland, Detroit (Windsor), Seattle and Tampa, Florida. T.C.A. also flies across the North Atlantic to London, Paris, Düsseldorf, Prestwick and Shannon. Trans-ocean routes reach south from Canada to Bermuda, the Bahamas, Jamaica and the Caribbean islands of Barbados and Trinidad.

The first commercial operations of T.C.A. began in September, 1937, between Vancouver and Seattle over a route of 122 miles previously operated by Canadian Airways Ltd. Within a few months, first-class mail began to be carried between Winnipeg and Vancouver, and night flying was inaugurated in Western Canada. Regular transcontinental air transportation began on April 1st, 1939.

Prior to the incorporation of T.C.A. by Act of Parliament in 1937, Canadian air transport operations were, for the most part, of the "bush" variety, serving isolated settlements and the nation's frontier fringe. Numerous small companies flying a great diversity of equipment on a "charter" or "contract" basis, moved large quantities of men and supplies over relatively short routes. Some scheduled services were in existence on the Pacific Coast, into the North West Territories and the Yukon and along the north shore of the St. Lawrence, and into the Maritimes—but the country had no co-ordinated air transport, no ocean-to-ocean airline. Airport, navigation and communication facilities adequate to support scheduled services by large aircraft were largely non-existent.

And it was the early Canadian bush pilots who were flying these services who started T.C.A. flying. Disciplined to the rigid requirements of an airline, they brought to the young airline the know-how gained in difficult northland flying. Then they moved from their pilots' seats into executive chairs. The result is that the top men in T.C.A. today have flying in their bones. Mixed with them are a good proportion of men who learned their flying in the equally hard school of wartime operations.

The Canadian Government, after making exhaustive surveys and preparations for a trans-continental airline, approached the Canadian National Railways, the Canadian Pacific Railway and Canadian Airways Limited (the largest air service then operating, now part of C.P.A.) for financial support for a transcontinental airline. For its share, the Government was to provide supervision and to set up adequate airports and communications services. The C.P.R. and Canadian Airways, which it partly owned even then, disagreed over representation, and all the shares in the new non-profit venture which developed into T.C.A. were bought by the Government-owned Canadian National Railways.

One good reason for T.C.A.'s success in recent years is its president, Gordon McGregor, O.B.E., D.F.C., a former Battle of Britain pilot. McGregor succeeded H.J. Symington, also a very able T.C.A. president, some time after the war. He will take office as I.A.T.A.'s President for 1953-54 at the Association's Annual General Meeting in Montreal.

T.C.A.'s management is responsible to a Board of nine directors who in turn must be in a position to assure the Government that the terms of what is known as the Trans-Canadian Air Lines Act are being adhered to by the company. Only one director is a Government Department officer, and no officer or employee of T.C.A. is a member of the Civil Service. Five directors are elected by the shareholders and four are appointed by Order-in-Council. In other words, T.C.A. operates much like any other privately-financed company, although its capital stock to the amount of $25,000,000 has been purchased by the Government through the C.N.R.

Technically, T.C.A. operates only within North America. A subsidiary company, Trans-Canada Air Lines (Atlantic) Limited, shares with the parent company its management and many functional branches, but its finances are completely segregated. It has its own aircraft which differ in some respects from those in North American service, and it operates under a separate agreement with the Government. This service is closely tied in with the policies of the Government in the establishment and maintenance of close trade relations which may weigh equally heavily with basic economic

T.C.A. has built up a model passenger service organization. Here is the Telephone Answering Service for reservations at Toronto.

T.C.A.'s ticket counter in the International Civil Aviation Building, Montreal.

considerations in the decision to establish any given international route. On the other hand political considerations play absolutely no part in the operating policies of the North American service. Trans-Canada Air Lines (Atlantic) Limited was formed as a result of the Canadian Government decision to span the Atlantic with T.C.A. early in 1943 to provide rapid transport of priority passengers, armed services mail and cargo.

Due to the pressure of air transportation during the war, T.C.A.'s Lockheed 14 equipment soon became greatly overtaxed, but apart from a few converted *Lancaster* bombers for the Government's Atlantic service, T.C.A. found it practically impossible to obtain new aircraft. At the end of hostilities, a fleet of Douglas C-47 surplus aircraft were purchased from the U.S. Government, and in a major overhaul operation these were converted to the DC-3 version. They have been the mainstay of the company's equipment for its short-haul domestic routes and only now are being gradually replaced. At the present time T.C.A. operates 26 DC-3s for passenger use and one DC-3 cargoliner.

In order to compete with other airlines in the post-war period and meet the needs of the war-time-created trans-Atlantic operation, T.C.A. found it necessary to procure modern four-engine transports. Being unable to buy commercial aircraft off the shelf, the Canadian Government found itself forced to consider manufacturing something of its own. Consequently the *North Stars* were built by Canadair on the basis of the Douglas DC-6 design and were powered with Rolls-Royce *Merlin* engines for high altitude flight. T.C.A. expected to fly over the Atlantic and across Canada at an average altitude from 23,000 to 25,000 feet, and believed that the operation of the *Merlins* would be more economical and would result in more speed because of their streamlined installations. Another reason for the choice of this type of engine was that the Canadian Government wanted to assist the United Kingdom in its export drive.

The use of the *North Star* transport, which is recognized to be a very good aircraft, is undoubtedly one of the reasons why T.C.A. now operates at a profit. They have accommodation for 48 passengers and space for 3,500 pounds of mail and cargo. In its early years, because of its abnormal wartime and post-war growth, as well as other causes, T.C.A. had operated in the red, but these red budgets are something belonging to the past. The main post-war cause of the deficits, seasonal fluctuations in traffic, has been replaced by an unprecedented build-up of demand for traffic throughout the year. This is partly because of the efforts of the sales department who, for instance, have offset the winter decline in domestic traffic by encouraging travel on the southern routes. Careful maintenance and planning have increased the utilization of the *North Stars* to over ten hours a day, a figure second to none in the air transport field. On the highly-competitive North Atlantic run, the new tourist service has produced an increase in the average passenger load factor to over 85 per cent.

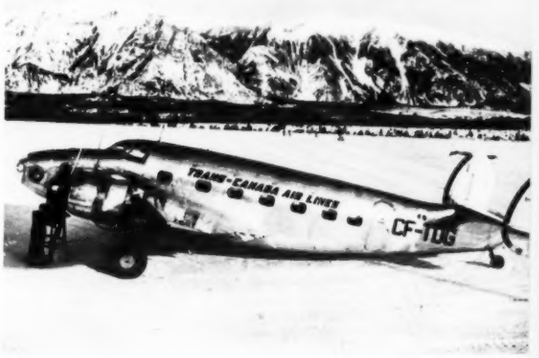
T.C.A.'s twenty (now 23) *North Stars* were first put into service on the North Atlantic in 1947 as the airline's overseas operations assumed full commercial identity. The new equipment brought almost double load capacity and increased speed and comfort considerably. Now a further move is being made to improve the Atlantic service of T.C.A. by introducing on it eight new Lockheed 1049C *Super Constellations,* which are scheduled for delivery in 1954. The *North Stars* will then be used on the domestic services alone. Another innovation by T.C.A. on the domestic routes will be 15 Vickers *Viscount* turboprop transports to be delivered next year. Initially the aircraft will accommodate 48 passengers with a crew of four. In addition, three Bristol 170 *Freighters* have been ordered. These aircraft, each capable of carrying six tons of load, will begin operation this year over the Winnipeg-Toronto-Montreal route.

The load-carrying capacity of the *North Star* fleet has also been increased by the recent conversion of these aircraft from 40 to 48 seats. Three Canadair C-4s or *North Stars* have also been purchased from Canadian Pacific Airlines. A weakness of the *North Star,* its noisiness, has been met by installation of cross-over exhaust mufflers.

Converted Avro *Lancaster* bombers were used for T.C.A.'s wartime mail and V.I.P. service across the Atlantic.

Trans-Canada Air Lines seems assured of continued progress. When addressing the Railway Club of Montreal recently, President McGregor said : "In my humble opinion the superiority of air travel over that by train is so great that I can predict the complete elimination of all first-class passenger train travel for distances beyond 500 miles in the near future." As McGregor sees it, air travel, in addition to its existing advantages of speed, comfort and cleanliness will add that of cheapness as well, as far as T.C.A. is concerned. He does not think the Canadian railroads will be sorry to discontinue a service which, he suspects, costs much more to maintain than the revenues which it produces.

The Lockheed 14's did yeoman service during the war, both on T.C.A.'s transcontinental and northern routes.



T.C.A.'s operations today extend across the Atlantic to London, Paris, Düsseldorf and other points.

Careful maintenance is one of T.C.A.'s mottoes. Shown here is an overhaul shop at T.C.A.'s Winnipeg base.

I.A.T.A. 1953

C.P.A. specializes in operations to Canada's deep North, where maintenance often poses extremely tough problems.

I.A.T.A.'s CANADIAN HOSTS—II

C.P.A.'s ten years of service

G. W. Grant McConachie, President of Canadian Pacific Airlines.

Canada's second great airline and joint host of I.A.T.A. at the latter's Annual General Meeting in Montreal, the privately owned Canadian Pacific Airlines, this year entered its second decade of service to Canada's North by expanding its activities with new routes to the Antipodes, Asia and now to South America. Starting in 1942 with an assortment of 77 aircraft of 14 varieties purchased from ten bush operators who were engaged in ruinous competition with each other, it has built up its fleet with standard modern airliners and now is preparing a trans-Pacific jet transport service. The inadequate rate structures and depreciation reserves which were bringing the bush operators to financial ruin when the Canadian Pacific Railway bought them out to form C.P.A. have changed to an economically-sound operation.

Today C.P.A. is a model of an integrated mainline and feeder operation which places Canada's large centres within a few hours of her remote borders. The whole Canadian Northland has been knit together by C.P.A. and joined to the rest of the nation and the world. Fares and cargo rates are much lower than they were when C.P.A. started, and traffic has increased continuously.

Passengers on C.P.A. routes "down North" are no longer treated like animated cargo but enjoy plush seats, tasty meals in flight and stewardess service just as on the mainlines. Four-engined pressurized-cabin equipment is being put into service where previously only float bush planes operated.

Many of the bush routes which now are part of the C.P.A. system were born in the 1920's, encouraged by such developments as the discovery of oil at Fort Norman, Northwest Territories, the rapid growth of the great gold-fields of Northern Quebec and Ontario, and the first "gold rush by air" to the rich Red Lake area of northwestern Ontario. During the depression years of the '30's, these airlines had their ups and downs, but survey work continued and new lines were put into operation, notably in British Columbia and the Yukon. To these early pioneers, many of whom flew during World War I, must go the credit for opening up the deep north of Canada. Although more often than not they flew by small skiplane or seaplane on a "by guess and by God" system of navigation with the pilot probably filling in as loader, traffic agent and treasurer, they initiated air freight and before the last war carried the world's heaviest payloads by air.

In the meantime the Canadian Pacific Railway Company had maintained an active interest in air transportation. Back in 1930, it had subscribed $250,000 to the newly-formed Canadian Airways Limited which only recently gave up its charter after many years of dormancy. In the summer of 1940, the railway made a survey of the privately-owned airlines of the Dominion and found many of them in bad financial condition, with destructive competition taking place in several areas and services and staff being duplicated and even tripled. Rates had been reduced to below operating costs and the future of air transportation in the remote areas of Canada was imperilled.

During the next two years, with Governmental approval, the Canadian Pacific Railway acquired practically complete ownership of all private air lines in Canada. These were all joined together in 1942 in the present C.P.A.

For several years C.P.A. maintained good, well-regulated services on all bush-flying routes. Then it went ahead to establish over these Canadian northern air routes a first-class airline inter-city type of operation based on its advance-guard work on navigation aids and communications. It replaced bush-pilot thinking, equipment and methods with mainline-type aircraft, operating procedures and schedules.

C.P.A. has done aviation in Canada signal service by promoting the use of radio range and instrument flying over all its routes, operating on its own now no less than 17 radio beacons. This airline does more extensive training in Automatic Direction Finder flying than any other operator in North America because it is so dependent on that type of flying. The training on the ADF, which involves the use of a ground transmitter and a radio compass homing on the ground station at all times, is also valuable in C.P.A.'s international flying, particularly in those regions which do not have range flying as in Canada but use non-directional radio beacons. Today in all the vast territory served only by bush fliers a few years ago, C.P.A. now flies VFR only three routes, and even these will soon be IFR. Instrument flights by day and night with procedure let-downs have brought a new meaning to frequency and dependability of northern schedules. C.P.A. pilots have shed the bush-type seat-of-pants methods of flying and have graduated to airline procedures.

Although proud of this achievement, C.P.A. naturally looks forward to the time when these facilities will be placed on the same Government-operated basis as in southern Canada.

To control ruinous competition in Canadian air transportation, the Government has reserved the north-south routes in Canada, particularly in the northern parts, for C.P.A., while ruling that T.C.A. alone shall fly transcontinentally. Internationally the Canadian Government has decided that scheduled services will be provided in the Pacific area by C.P.A. and in the Atlantic area by T.C.A.

Canadian Pacific has one of the most interesting and promising jobs among North American carriers. It now serves 9,525 miles of domestic

"northern" routes covering four-fifths of Canada which were formerly accessible only by dog sled and river boat, as well as 15,295 route miles across the Pacific. "The wings of the world's greatest travel system" now spread from the Northern Lights to the Southern Cross and all the way from the St. Lawrence to the South China Sea.

From Vancouver's International Airport, Canadian Pacific operates fortnightly flights to Australia and New Zealand via San Francisco, Honolulu, Canton Island and Fiji and weekly flights north via the Great Circle to Tokyo and Hong Kong, with fuelling stops at Anchorage, Alaska, and Shemya in the Aleutian Islands. With the advent of the Korean war, the company increased its flights under a Canadian Government charter plan to take an active part in "airlift" operations to and from Tokyo.

C.P.A.'s present fleet is mainly made up of DC-4s, DC-3s and a few twin-engined amphibians for northern lakeland flying. It is now adding five Convair-Liners for high-altitude routes in British Columbia particularly, and three Douglas DC-6Bs and, later on, *Comets*.

C.P.A.'s new equipment for its Pacific routes is expected to cut the flying time from Canada to Australia and New Zealand to 20 hours. The Douglas DC-6B aircraft will bear most of this traffic. The company also has two *Comet IAs* on order, but one of these crashed on the delivery flight last March and the second has just been sold to B.O.A.C. It still holds options to purchase four Comet IIIs. Recently the company purchased three more DC-4 transports to be used on its domestic routes.

The C.P.A. version of the Douglas DC-6B will be equipped with sleeper-type seats in the main cabin. Up forward will be two four-seat de luxe compartments with berthable seats as well as upper berths. In addition to the standard galley, where meals will be prepared, there will also be a special bar at the rear of the cabin. The aircraft is highly versatile, being able to be converted to a 64-passenger plane for medium density traffic or to an 87-seat version, giving rise to the supposition that eventually C.P.A. might be interested in introducing a coach class of service on Canada's transcontinental routes.

Canadian Pacific has established its headquarters at the Vancouver Airport in the former Boeing Aircraft Company's hangar and building. From this hub is handled all the executive, administrative, operational and maintenance work by a staff of 900-odd employees. Here is a complete high-precision maintenance and overhaul shop, one of the most modern in Canada, fitted with all types of machinery available for this work. Both domestic and trans-ocean aircraft are serviced in this shop.

C.P.A.'s President in Grant McConachie, whose major role developing north country flying during the 1930's won him the annual McKee Trophy, emblematic of prime flying achievement in Canada. The high regard in which he is held is evidenced by his presidency last year of the Air Industries and Transport Association. He pioneered the wartime Northwest Staging Route in Canada and inaugurated radio compass flying in the north, establishing stations to accomplish this purpose along the route. A firm believer in land planes as opposed to the float planes in general use when he started bush flying in the '30's, he worked with various local business men and Government officials in the development of suitable landing strips to handle twin-engined land planes. It was this work that made possible the rapid development of the Northwest Staging Route, over which planes were ferried from U.S. aircraft factories to Soviet Russia.

The know-how and experience of such C.P.A. bush pilots as McConachie proved invaluable during the last war in other respects, notably for the organization of a ferry service of American-made bombers over the Atlantic to Britain. For 13 months from its initiation, C.P.A. with C.H. "Punch" Dickins in charge carried on the service. It remained essentially the same when taken over by the R.A.F. and U.S.A.F. Today's trans-Atlantic air travel owes much to these early pioneers on this most difficult and dangerous route. C.P.A. also operated various air observer schools in Canada as part of the British Commonwealth Air Training Plan.

Such examples of versatility and original planning are also in evidence today. There's the new 18-hour route between Vancouver and Lima, Peru, on which experimental flights were started in July and which is projected across the Andes to Rio de Janeiro. Still in the future is the non-stop route planned over the Pole between Vancouver and London for which C.P.A., because of its experience in such flying, would seem ideally suited. Flying along a Great Circle course, it would provide the fastest transportation between Asia and Europe and between Britain and Australia.

C.P.A.'s equipment program calls for Convair 340's for medium stage routes.

For its long hauls C.P.A. has ordered a number of Douglas DC-6B's.

After the war C.P.A. bought a number of Canadair-Four airliners, recently sold them to Trans Canada Air Lines.

C.P.A. had ordered two *Comet IA's* for its Pacific operations. One crashed at Karachi, the other was sold to B.O.A.C., and the company now seems to be waiting for the *Comet III*.

Vancouver International Airport, British Columbia, main base of C.P.A.

C.P.A.'s headquarters at Vancouver Airport, B. C.

A.I.C.M.A.

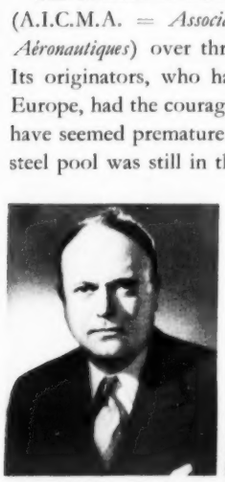
BY GEORGES HÉREIL,

PRESIDENT OF THE «ASSOCIATION INTERNATIONALE DES CONSTRUCTEURS DE MATÉRIELS AÉRONAUTIQUES»;
HONORARY PRESIDENT OF THE FRENCH «UNION SYNDICALE DES INDUSTRIES AÉRONAUTIQUES»;
CHAIRMAN AND MANAGING DIRECTOR OF «S.N.C.A. DU SUD-EST».

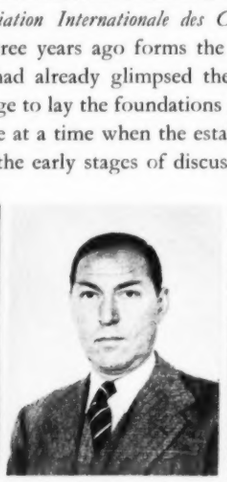
Nowhere perhaps more than in aeronautical engineering is there a greater disparity between the creative potential of Western civilization in the industrial field and the resources available to the nations who have fathered this civilization to translate potential into reality. Aeronautical engineering creates machines which reduce the dimensions of continents. But the production of these machines, which know no frontiers, is beyond the resources of any one country and demands funds on continental or even global scale. Scientific and technical progress continues to accelerate its pace without regard for the limitations of national economies imposed by the slow rate of political evolution.

In its issue No. 7, 1953, entitled "In Europe's Laboratories," *Interavia* published a series of articles describing Europe's contribution to aeronautical engineering. In one of them Lt.-Colonel Pierre M. Gallois discusses with his accustomed mastery the problems set the European nations by what he calls "the new burdens of design and engineering." And he writes: "the simplest solution, which is, however, the most difficult to apply, is to go beyond national boundaries, pooling scientific capital, test and experimental facilities, and markets."

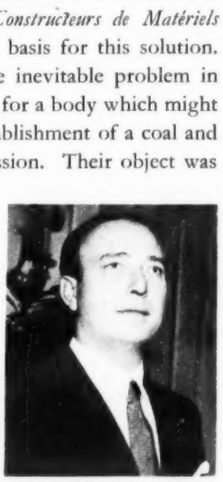
The creation of the International Aircraft Manufacturers Association (A.I.C.M.A. = *Association Internationale des Constructeurs de Matériels Aéronautiques*) over three years ago forms the basis for this solution. Its originators, who had already glimpsed the inevitable problem in Europe, had the courage to lay the foundations for a body which might have seemed premature at a time when the establishment of a coal and steel pool was still in the early stages of discussion. Their object was to show both their confidence in the potential of the aircraft industries they represented and their intention of working in a common effort to perfect this industry, one of the essential elements in the mutual defence and economic prosperity of their countries.



Georges Héreil, President of A.I.C.M.A.



The late Peter Vos, Managing Director of Fokker, who was instrumental in the formation of A.I.C.M.A.



Dr. Giuseppe Gabrielli, Managing Director of Fiat's Aviation Division, is the chairman of A.I.C.M.A.'s Technical and Scientific Committee.

*

A.I.C.M.A. was founded in Paris on April 28th, 1950. Manufacturers from six countries, Belgium, France, Italy, Netherlands, Norway and Spain, were represented from the beginning. Denmark became a member at the second meeting, Swiss manufacturers joined us in June of this year, and the Swedes sent observers to our last meeting. Within each of these countries all the firms concerned with aircraft production are represented. If Germany regains the right to make flying equipment, her admission to membership in A.I.C.M.A. would present no difficulties. Finally, Jugoslavia is also expected to join us. When, in collaboration with the late Peter Vos, Manager of the company to which we owe our successs, we laid the foundations for the Association in 1949, we thought that Great Britain would naturally become a member. When we approached the Society of British Aircraft Constructors on the subject, however, we received a non-committal reply. Subsequently, while expressing their sympathy with the aims of our group, British manufacturers indicated that they preferred to remain independent. The position has since crystallized, and A.I.C.M.A. for its part is now anxious to remain within the European metric system. Nevertheless it enjoys excellent relations with S.B.A.C. and with the Aircraft Industries Association of America.

The total labour force of the aircraft industries in the countries represented in A.I.C.M.A. is in the neighbourhood of 90,000, of whom 60,000 are employed in France alone. Compared with the 660,000 persons employed in the United States, or even the 206,000 in Britain, this figure illustrates both the shortage of financial resources available to continental Europe for its aviation and the industry's potential for expansion. The eight countries now belonging to A.I.C.M.A. represent a *bloc* of 140,000,000 inhabitants, or 210,000,000 counting Sweden and Germany. Whereas the United States, as Pierre Gallois pointed out in the article quoted, is finding it impossible to recruit more than 26,000 engineers and technicians a year, to meet a need for 60,000, the Western European *bloc*, consisting as it does of highly industrialized nations, still has vast resources in this field. Rich in brains and ideas, in industrial resources and raw materials, such a *bloc* should be able, by coordinating efforts and pooling resources, rapidly to take the lead in matters of aviation. I am thinking in particular ot the formation of an international company for the production of aircraft engines, combining the efforts, for example, of France, Germany and Italy.

Coordination of European efforts must be extended beyond design to production. Everything must be done to reduce progressively all duplication in both equipment and programmes, while still preserving healthy competition. This is an essential condition for reducing prices and getting the utmost out of Europe's defence budgets.

A word on the markets open to A.I.C.M.A. manufacturers. The first requirement, of course, is to satisfy the needs, both civil and military, of the countries they represent. The former needs extend beyond the European peninsula to the continent of Africa, whose opening up will increasingly require and justify the use of the aircraft. As regards military needs, it is well known that, because of the immediate tactical role they would be called upon to play in the event of war, the air forces form one of the major headaches for the inter-Allied command. Thus the equipment of the units stationed on the continent with tactical aircraft is one of the A.I.C.M.A. manufacturers' most urgent tasks. Europe's creative cooperation in mutual defence will be all the more appreciated by our American partners, since this is a category of equipment to which they, in view of their geographical situation, have not given first priority in their national programmes. Again, the production of the *Hunter* under licence by the continental industry, or of spares for equipment such as the F-84 and the F-86 under sub-contract or under licence, provides valuable support for the N.A.T.O. forces and bears witness to the confidence felt by A.I.C.M.A. manufacturers in the matter of quantity production.

It is because of this confidence, because of the value of their own designs and because of the reduction in costs which can be obtained by the integration of European aircraft manufacture, that the members of A.I.C.M.A. can hope to extend their markets beyond the immediate needs of their own countries. Recent orders for up-to-date French equipment from South America and the East are proof of this.

According to its articles of association, A.I.C.M.A. is a permanent liaison organization whose objects are as follows :

1. to examine jointly all questions concerning the development and future of the aircraft industry in general ;

2. to determine and suggest the direction which it is considered advisable for all the groups of manufacturers represented in the International Association to follow ;

3. to represent these groups of manufacturers in all questions where joint action is regarded as necessary.

The activities of A.I.C.M.A. during the past three years have included not only the work of its meetings and committees but also, in more indirect fashion, the technical and industrial contacts which it has brought about or facilitated among its members or between the latter and manufacturers outside the Association. For example, when licences for British or American equipment have been taken by a number of countries belonging to A.I.C.M.A., the conversions into metric measures—a fundamental connecting link between the countries of Continental Europe—have been done once only, and the costs shared by the various users. A.I.C.M.A. maintains relations with S.B.A.C. and A.I.A. in the Anglo-Saxon countries and with international research organizations such as the Advisory Group for Aircraft Research and Development, or scientific associations, such as the *Association Française des Ingénieurs et Techniciens de l'Aéronautique* with which it collaborates in particular in connection with such international events as the International Aeronautical Congress or the European Aeronautical Congress. Then, S.N.C.A. du Sud-Est has concluded an agreement with Westland in Britain and with Fiat S.A. of Turin, on the production of Sikorsky S-55 helicopters for the European market—the type we had the pleasure of demonstrating to our Swiss and Italian friends last June.

On the pure A.I.C.M.A. level our work has been directed towards :

1. standardization, within the committee set up for the purpose and presided over by M. Vinsonneau, Technical Director of *S.N.C.A. du Sud-Ouest ;* this committee has studied in particular the standardization of the methods of converting English into metric measures, standardization of parts and structural elements, in collaboration with the International Standards Bureau and N.A.T.O. ; it also draws up standard information sheets concerning parts in current use and equipment made in Europe under British and American licence ;

2. preparation of a policy of scientific research designed to coordinate efforts ; this is the task of the Technical and Scientific Committee, presided over by Professor Gabrielli, which maintains contact on this subject with A.G.A.R.D. ; we are also discussing the creation of a European study group to draw up an investment plan, in particular for the construction of a supersonic wind tunnel installation. The French Government has supported A.I.C.M.A. by agreeing that the *Office National d'Etudes et de Recherches Aéronautiques* wind tunnel at Modane, and the Istres and Colomb-Béchar test equipment may be used by all members.

The division of tasks among A.I.C.M.A. members, one of the essential articles of our creed, is based on the following principles : in the matter of airframes Europe is already over-equipped, and it would therefore be useless to create new factories ; all that need be done is to complete the equipment of existing plant, where this is necessary. As regards engines, on the contrary, a great deal remains to be done, and the solution must be sought in the exchange of personnel and the internationalization of capital within each company which has the support of the various countries in Europe ; finally, in the field of equipment, the variety and cost of which are increasing every day, a country's specialities, experience and natural resources must provide the criterion for the distribution of production.

A.I.C.M.A. is still young, but this is not a fault in the aviation world, and it has already done useful work, especially in creating among European manufacturers the spirit of understanding and cooperation which is indispensable to their development. For my part I do not believe it will be possible in the long run to keep efficient aircraft industries alive within air-tight compartments in each of the countries of Europe.

The integration of arms production is an important means of avoiding future conflicts of the kind that have torn the continent apart in the past. What is more, European aviation is destined to play an important part in maintaining peace in the world.

Death of Professor Ludwig Prandtl

Professor Ludwig Prandtl, Dr. phil., Dr.-Ing. h. c., Dr. rer. techn. h. c., D. sc. h. c., one of the great figures in German aeronautical science, died at Göttingen on August 15th, 1953, after a long illness.

Born at Freising, Lower Bavaria, on February 4th, 1875, Ludwig Prandtl studied engineering at Munich Technical University and in 1898 became assistant at the latter's mechanical-technical laboratory. After a brief period with Maschinenbaugesellschaft Nürnberg, he was called to Hanover Technical University in 1901 and to Göttingen University in 1904 as Professor of technical physics. There he made, with very simple equipment, his first aerodynamic studies and experiments, which revealed the importance of the boundary layer. On the results of this work he was made full professor in 1907, founded the first model-testing institute for aviation and set up the first wind tunnel with closed circuit, which helped to establish the fame of the Göttingen School of Aerodynamics. For the next two decades Ludwig Prandtl directed the Kaiser Wilhelm Institute for Fluids Research in Göttingen (successor to the model-test establishment), which was renamed the Max Planck Institute for Fluids Research after the last war. He did not retire from active academic work until 1947, but even then continued his research, particularly in connection with meteorology.

Professor Ludwig Prandtl held honorary degrees from a number of German universities and from the University of Cambridge. He was an honorary member of the German Society of the Aeronautical Sciences (Wissenschaftliche Gesellschaft für Luftfahrt), holder of the Gold Medal of the Royal Aeronautical Society and the Ernst Abbé Memorial medal and author of a large number of scientific papers, including (with Prof. A. Betz) the "Results of the Göttingen Aerodynamic Research Institute, 1925-1932." His whole life was devoted to the advancement of science.

From Geneva

Switzerland's

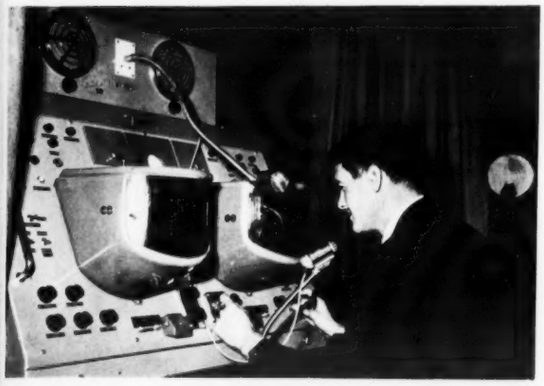
Front view of Cointrin Airport building, Geneva.

The main lobby at Cointrin.

May 21st, 1949, and August 29th, 1953, are both milestones in the history of Switzerland's airport organization, today one of the most up-to-date in the world. On the former date Geneva's intercontinental airport was opened, and on the latter it was the turn of Cointrin's big brother Kloten. It has taken nearly forty years for Switzerland to get herself the installations with which she is now taking her full part in world air transportation. More than a dozen foreign airlines now operate to Geneva-Cointrin and Zurich-Kloten every week, and many of them every day.

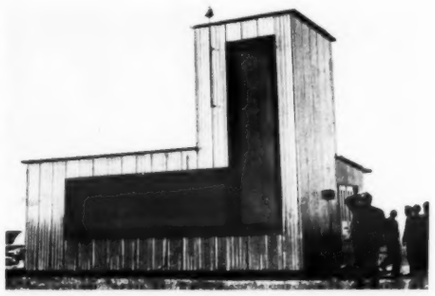
The ceremonial opening of Zurich's airport at the end of August was attended by a brilliant assembly of guests from Switzerland and abroad, and one of the opening speeches was by the Swiss President, Dr. Philipp Etter. What he had to say, therefore, was addressed not only to his own country-men, but also to representatives of air transport, trade and commerce from throughout the world. Etter's words show two typical Swiss characteristics—consciousness of internal and external limitations, and the desire to maintain mutual contact with the rest of Europe and overseas.

"... Switzerland is a land-locked country... The vast seas which unite continents and nations nowhere beat upon Swiss shores.



The P.A.R. installation built by Compagnie Française Thomson-Houston of Paris, which was put into operation at Geneva-Cointrin on August 24th, 1953. It is shortly to be supplemented by a Surveillance Radar Equipment made by the same firm, so that Cointrin will have a complete G.C.A. installation.—Technical details were published in Issue No. 9, pp. 534 etc.

The main lobby of Cointrin air terminal facing the apron.



P.A.R. aerial building on airport.

Paul Meierhans, head of the Zurich Public Works Department, which is responsible for Kloten (at the inauguration of Kloten).

His Geneva colleague, Jean Treina, President of the Department of Commerce and Industry, which controls Cointrin.

Dr. E. Altorfer, the Canton of Zurich's Delegate for Air Transport.

Charles Bratschi, Manager of Geneva-Cointrin.

Guests at the opening of Zurich-Kloten.

Dr. Philipp Etter, President of Switzerland (left), in conversation with Swiss industrialist E. G. Bührle.

Dr. A. Plesman, President of K.L.M. (left).

International Airports

to Zurich

Front view of Kloten terminal building.

We were born land-lubbers and have remained land-lubbers. And yet there lives in our hearts a yearning for far-away places, for contacts with the big wide world. This is not merely a sentimental attitude. All branches of our economy and industry, as well as our scientific and cultural activities, are dependent upon constant close contact with the outside world. That is why our country's airports are of national importance."

*

Note : a small inland country with a population of roughly 4,500,000 and a few fair-sized towns, among which Zurich at present numbers barely half a million inhabitants, while the population of Geneva, despite its international importance, just about reaches 200,000, has created a ground organization on which it has spent several hundred million Swiss francs. Geneva's airport, in almost unique surroundings and a model of architectural and technical excellence, cost roughly 40 million francs, and at least 120 million has been spent on Zurich's airport. Both are constantly being improved and enlarged. The citizens of these towns and the Federal Government reach into their pockets every year without a murmur to make sure that Switzerland shall keep in touch with the wide world outside.

Zurich-Kloten's main lobby (town side).

Special stamp issued for Kloten's inauguration.

Kloten air terminal's main lobby (airport side).

Per A. Norlin, President of Scandinavian Airlines System (left) talking to Mr. Ljungström, Secretary-General of the International Civil Aviation Organization.

Dr. W. Berchtold, Managing Director of Swissair and I.A.T.A. President for 1952/53 (centre).

Sir Miles Thomas, Chairman of B.O.A.C. left, Lady Thomas, right Lady Douglas (wife of B.E.A.'s Chairman).

Lord Douglas of Kirtleside, Chairman of British European Airways ; right of him, his wife.

Dr. J. T. Lacour, Professor of Air Law at the University of Geneva (left), in conversation with the Danish Consul-General in Zurich, Dr. Blass.

Guests at the Kloten cocktail party : centre, Pierre G. Desautels, TWA's Manager in Europe, with his wife.

A Buckshee Ride

SCENE I

(Scene represents the office of the Editor of a large Paris paper, "L'Araignée du Soir."*)

EDITOR *(green eye-shade, heavy spectacles, feet on desk . . . like the "big shots" of journalism in the American films) :*

. . . O. K. that's settled, you'll do me Farnborough . . . A thousand words by telephone every day . . . and make it good and hot . . .

AIR CORRESPONDENT : What about expenses ? Can I have an advance ?

EDITOR : Sure, get some sterling from the cashier . . . Fix up the trip yourself . . . with all your pals in the airlines you can easily get yourself a buckshee ride . . .

SCENE II

(These words marked the end of the interview, and the Air Correspondent goes back to the office which he shares with the Racing Editor and "Heard in the Courts.")

AIR CORRESPONDENT (on the telephone) : Hallo, is that Aero-Aera ? Give me M. Durand please . . . Is that you, Durand ? Listen : the boss wants me to go to Farnborough, but he's not paying my fare. So I though maybe . . . would there be a chance of a trip with you . . . a seat that's not booked . . . Any plane would do . . .

What d'you say ? I.A.T.A. ? Twenty thousand dollars fine ? I can whistle for a free passage ? O. K. Monsieur Durand, I'll try somebody else.

(At his most dignified the Air Correspondent rings off, then calls the British airline Aera-Aero.)

That you, Smith ? I wonder if you can help me ? My paper's sending me to Farnborough, but I have to pay my own trip. So I wondered if perhaps there might be a spare seat going begging on one of your flights. It would be good advertising for you . . . What ? I.A.T.A. forbids it ? O. K. . . . thanks all the same . . .

SCENE III

(At Aero-Aera's ticket office.)

AIR CORRESPONDENT : One London return, please, first service Monday morning.

BOOKING CLERK : Here you are, sir . . . 10,600 francs please. What is your name ? And your occupation ?

AIR CORRESPONDENT : Air . . . No, better put "no occupation."

SCENE IV

(Back in the Editor's office.)

EDITOR *(without raising his eyes) :* When are you off ? By the way, did you get your buckshee passage ?

AIR CORRESPONDENT *(somewhat embarrassed) :* I'm leaving Monday on the first flight, but . . .

EDITOR *(preoccupied) :* That's fine ; I was sure you would fix it. Poor show if an expert like you can't get a free trip every now and then. Incidentally, you might fix me up something for Scandinavia for the holidays . . . with my wife and kid, of course . . . I'll talk to you about it later . . .

SCENE V

(Dejected, the Air Correspondent returns to his office.)

Three tickets to Scandinavia ! They'll cost me a month's salary. I'd sooner get another job.

(And he sits down and drafts a letter to the boss : "I should like to ask for a transfer to Obituary Notices.")

Instead of asking for free trips I'll be writing about guys that got them—one way only.

CURTAIN

*

This little drama is almost true to life. I.A.T.A. really does not permit its members to give free passages to journalists, not even to those who can be most useful to them. It was different before the war, when the airlines made their own decisions and bore their own responsibilities. In those days they had the "S" system for journalists. "S" stood for "Subject to space" and provided *free trips for newspapermen if there were empty seats available.* A favour that cost them nothing, but gave the airlines a lot of good publicity.

The French *Association des Journalistes Professionnels de l'Aéronautique,* of which I have the honour to be President, has several times tried to persuade I.A.T.A. to change this rule. But each time the United States Civil Aeronautics Administration has disapproved . . . and airlines throughout the world are obliged to bow to the American decision ! This reminds us of the veto placed by a small Asiatic company on B.E.A. and Air France's request to be permitted to serve wine between Paris and London.

Aviation journalists are not asking for free pleasure trips. They need to fly so that they know what they are writing about. They need to be able to compare standard with tourist services, to judge the comfort and flying qualities of the various types of aircraft, to report on what is good . . . and what is not so good. They are experienced travellers and could act not only as excellent publicity agents for the airlines, but also as very efficient unpaid and *anonymous* inspectors.

There is obviously no question of "favours" here, but simply of an exchange of services in which each side gets its money's worth. Might it be different in the United States ? Here we rate ourselves much too highly to be "bought" with an air trip, even if it is a trip round the world !

GEORGES FÉVRIER,
PRESIDENT OF THE « ASSOCIATION DES JOURNALISTES PROFESSIONNELS DE L'AÉRONAUTIQUE », PARIS.

Still, we are persevering ! Our efforts have not been successful, but the struggle goes on. Perhaps the European Association of Aviation Journalists, which we are now forming, will be more fortunate than our French group . . .

* "The Evening Spider."

The cream of the United States strategic bomber fleet : The two prototypes of the Boeing B-52 *Stratofortress* long-range bomber over the summit of Mount Rainier (14,408 ft.) in the Cascade Mountains.

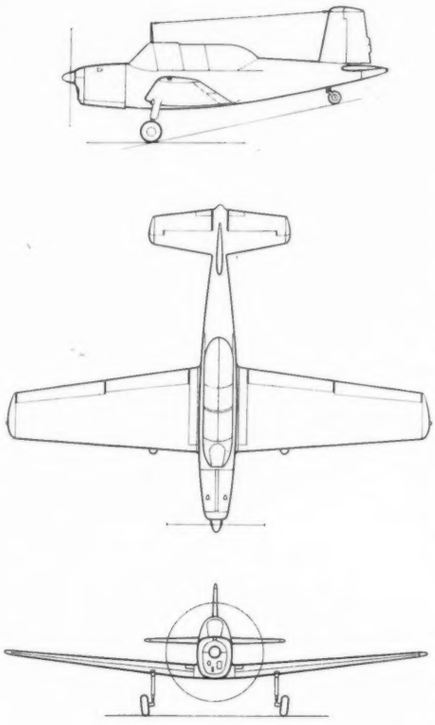
AISA I-115

A Spanish Trainer

Spain is today making notable efforts to revitalise her aircraft industry and, insofar as her resources permit, to bring it up to international standards. Her main object is to cover her domestic requirements as far as possible with Spanish designs and in particular to provide the Air Force on the one hand and the aero clubs on the other with the flying equipment urgently required for training a new generation of pilots.

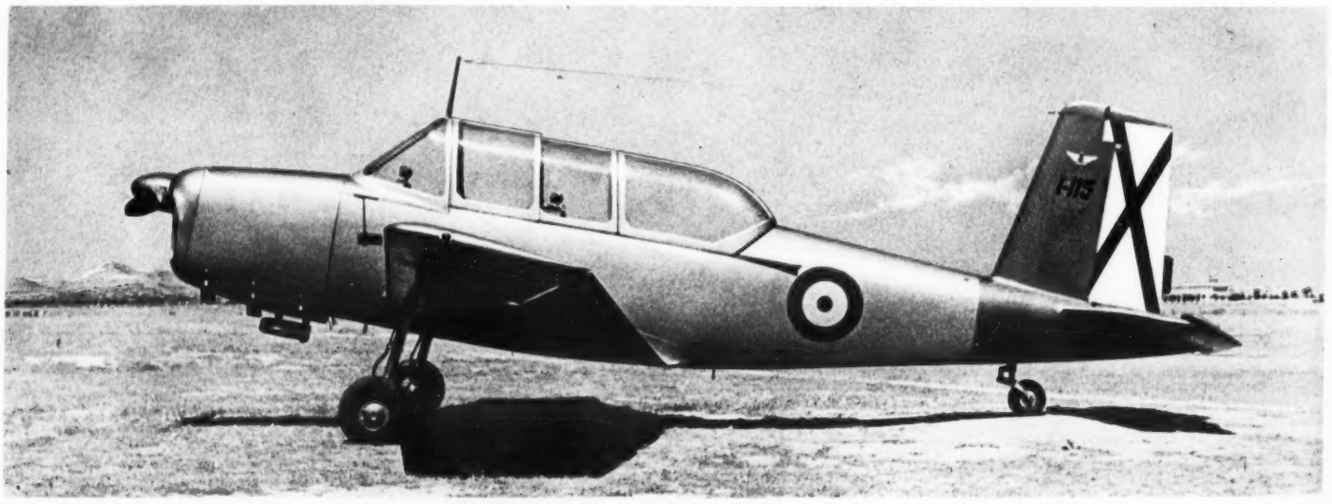
This "renaissance of the industry," after years of neglect due first to the Civil War and then to World War II, is being extended to practically all aircraft and engine firms and to the whole of the accessories industry. After an initial phase of design work and prototype production, aircraft of Spanish design are today in the first stages of quantity production. Reports have also been received of projected new designs, examples of which are the CASA 207 *Azor* twin-engined airliner for 30 to 38 passengers, the CASA 208 passenger and freight transport with twin tail booms (like the Fairchild *Packet*) and the interesting Hispano HA-120 R-1 jet trainer.

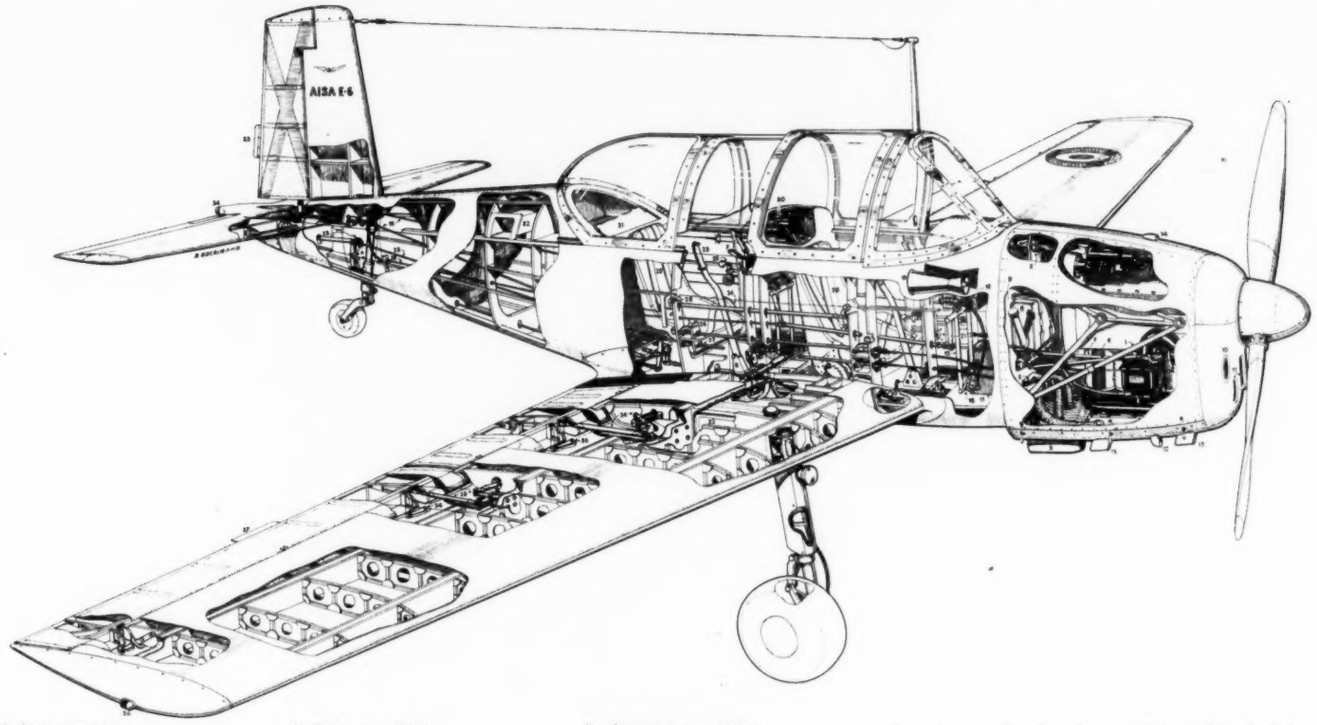
One of the most interesting new models in the trainer field has been brought out by Aerotecnica Industrial S.A. (AISA)—whose plant is at Carabanchel Alto Airport, Madrid. This is the *AISA I-115* two-seater low-wing monoplane (military designation E-6), a development of the AISA I-11 *Peque* light two-seater trainer. It was designed by the aircraft division of Iberavia S.A., which has since been absorbed by AISA.



The I-115 is of conventional structure. It is an all-wood design with fixed tail-wheel undercarriage. The one-piece cantilever wing has a NACA 230 airfoil of 15% relative thickness at the root and 9% at the tips. A twin-spar structure was chosen, and the whole wing unit, with the exception of the fabric-covered ailerons and landing flaps, is covered with plywood. The ailerons are coupled with the landing flaps and can be deflected with the latter. The fuselage is of wooden monocoque construction. Finally, the tail surfaces are also of wooden construction ; the control surfaces are fabric-covered, and both the elevators and the rudder have trimming tabs (those on the elevators are adjustable in flight). The undercarriage, as already mentioned, is fixed and provided with hydraulic shock absorbers and wheel brakes. A special feature is that both pilots have identical instrumentation. The distinction frequently made in basic trainers between the student's seat and the instructor's seat is not found in the I-115, a good way of accustoming the student from the very early stages to independent action under realistic conditions.

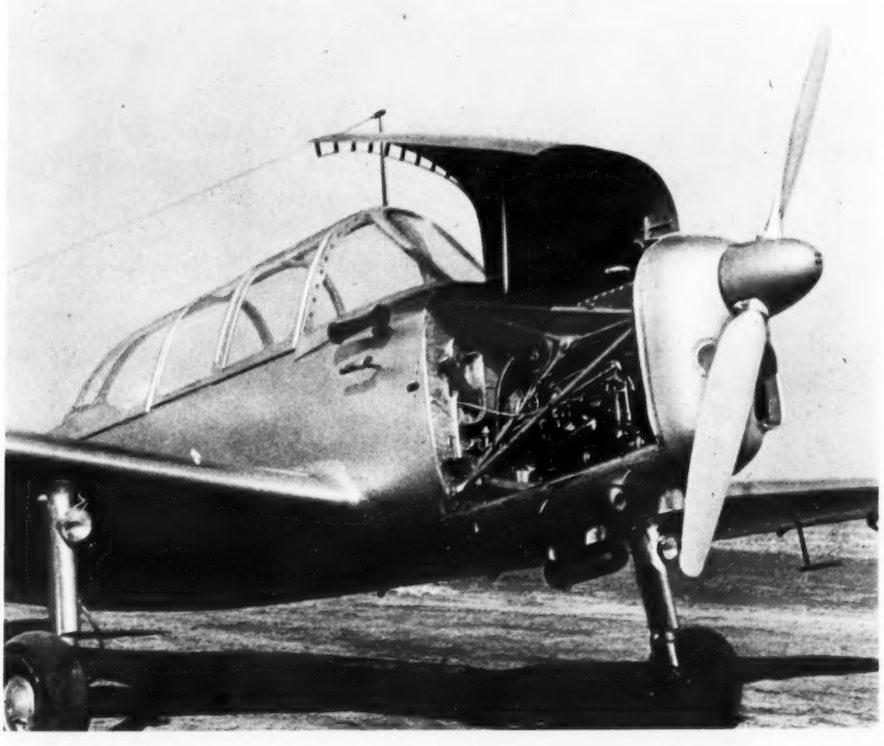
Although the I-115 has been developed primarily for basic training, it is fully acrobatic when flown as a single-seater. Even with two occupants, limited acrobatic training can





1. Engine support
2. Engine attachment at first fuselage bulkhead
3. Oil radiator
4. Cabin heater
5. Cabin air intake manifold
6. Throttle lever
7. High altitude air lever
8. Lubricant tank
9. Fireproof bulkhead
10. Intake for combustion air
11. Cooling air intake
12. Intake aperture for cabin ventilation
13. Exhaust manifold
14. Air intake for magneto cooling
15. Controls
16. Brake pedals
17. Battery
18. Transmitter and receiver
19. Pitot nozzle
20. Fuselage/wing attachment
21. Emergency fuel pump
22. Fuel tank
23. Control column
24. Landing flap operation
25. Lever for elevator trimming
26. Temperature regulator for combustion air
27. Control for cabin air
28. Tail wheel locking mechanism
29. Adjustable pilots' seats
30. Instrument panel
31. Baggage hold
32. First aid equipment
33. Rudder trimming tab
34. Position lamps
35. Landing flap control rod
36. Aileron control rod
37. Aileron trimming flap

The AISA I-115 was designed for simple maintenance with limited equipment.



be given. It also has sufficient blind flying and radio equipment to enable it to be used if necessary for the first stage of transition training and for blind flying training.

Characteristics and performance

Power plant	Elizalde *Tigre* G-IV-B
Take-off power	150 h.p.
Propeller	2-bladed v.p. ; metal ; blades adjustable on the ground
Fuel (in two wing-tanks)	135 lit. (30 Imp. gals)

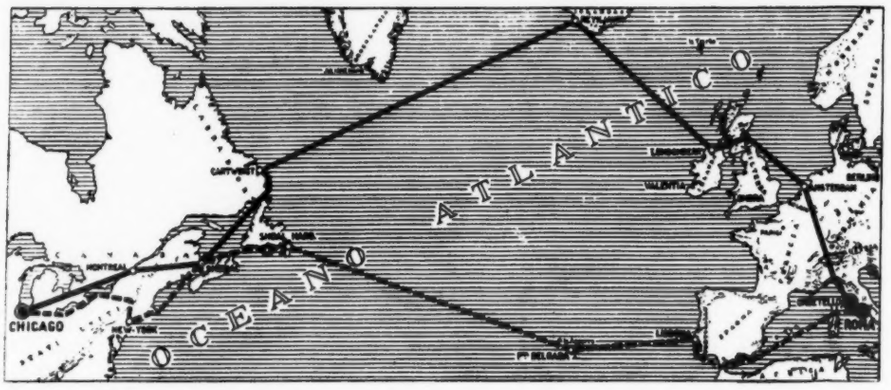
Dimensions and weights (as two-seater)

Span	9.54 m (31 ft. 3 in.)
Length	7.35 m (24 ft. 1 in.)
Height	2.10 m (6 ft. 10 in.)
Wing area	14 m^2 (150.69 sq. ft.)
Aspect ratio	6.5
Weight empty	612 kg (1,346 lbs.)
Gross weight	900 kg (1,980 lbs.)
Wing loading	64.3 kg/m^2 (13.18 lbs./sq. in.)
Power loading	6 kg/h.p. (13.2 lbs/h.p.)

Performance

Max. speed	240 km/h (149 m.p.h.)
Cruising speed	204 km/h (126 m.p.h.)
Landing speed (with flaps)	81.5 km/h (51 m.p.h.)
Service ceiling	4,400 m (14,400 ft.)
Rate of climb near ground	3.75 m/sec (740 ft/min)
Endurance (70% power)	3.5 hrs.
Take-off run to clear 50 ft. obstruction	380 m (1,245 ft.)
Landing run over 50 ft. obstruction	350 m (1,150 ft.)

Twenty years ago...



Map of the 1933 North Atlantic cruise.

Twenty years ago—on July 1st, 1933—a mass formation of twenty-four twin-engined Savoia-Marchetti S.55X twin-hull flying-boats commanded by the then General Italo Balbo, Italy's Air Minister, took off from Orbetello marine air base, near Rome, for the most spectacular overwater flying feat achieved until that time. The formation returned to the Lido near Rome on August 12th, after covering 19,700 kilometres in thirteen stages, namely Rome-Amsterdam-Londonderry-Reykjavik-Cartwright (Labrador)-Shediac (Canada)-Montreal-Chicago-New York-Shediac-Shoal Harbour-(Newfoundland)-Punta Delgada (Azores)-Lisbon-Rome. Upon his triumphal return to Rome, Italo Balbo was made a Marshal of the Air. Early in November of the same year Mussolini "promoted him out" of the Service and made him Governor of Libya because at home he had become too popular. As is known, Italo Balbo was shot down by mistake above Tobruk, Libya, by the anti-aircraft guns of the Italian cruiser *San Giorgio* on June 28th, 1940, a few days after Italy's entry into the war.

The twentieth anniversary of Italo Balbo's memorable North Atlantic air cruise was celebrated in August by the Italian Air Force and the United States Air Force in Rome. The Italian airmen inaugurated a monument at the former Orbetello air base, where Balbo's "mass flight" crews had been trained. The Americans, through Colonel E. B. Cassady, U.S. Air Attaché in Rome, invited 25 of the Italian pilots who had participated in the flight to a luncheon attended by Her Excellency the Ambassadress in Rome, Mrs. Claire Booth Luce, and General David Schlatter, Commanding General of Allied Air Forces in Southern Europe. Present were also G. Codacci-Pisanelli, the new Italian Minister of Defence, as well as Generals G. Valle, dean of Italian Air Force pilots; General A. Urbani, Chief of the Air Staff; General F. Silvestri, Secretary General of the Air Force at the Ministry of Defence; and General M. Pezzi, Chief of Cabinet to the Defence Minister. Other notable guests included A. Marchetti, builder of the Savoia-Marchetti S.55X flying-boats, and Colonel C. Pezzani, the senior technical officer to take part in the cruise. Unable to join their comrades in the celebration were a number of veterans, including five officers of General's rank and several colonels and lieutenant-colonels.

The last official photo of Air Marshal Italo Balbo, the late Italian Air Minister who commanded the mass flight to North America of 1933.

The monument erected in Air Marshal Balbo's honour at Orbetello, the former air base near Rome, where the crews for the various Italian formation flights underwent their specialized training.

Major Nino Zingales painted this scene of the Savoia-Marchetti S.55X flying-boats arriving in New York especially for the U.S.A.F. luncheon.

The usual toasts were exchanged by Mrs. Claire Booth Luce, Colonel Cassady, Defence Minister Codacci-Pisanelli, and Generals Valle, Urbani and Napoli—the latter as the oldest of the pilots having taken part in the cruise who were able to attend. Finally, a special message was sent to the gathering by Countess Emanuella Fiorio-Balbo, widow of the late Marshal.

Twenty years is a long time, and the years have taken their toll among the 99 men who accomplished the flight of 1933. Out of 99 crew members, 35 have died or were killed in the war. Apart from Marshal Balbo, these included General Aldo Pellegrini and General Stefano Cagno, as well as 22 other officers and 10 N.C.O.'s.

Autograph Hunter's Corner

Below are the signatures of the 25 North Atlantic cruise pilots who were present at the commemorative luncheon in Rome.

Brigadier-General R. Abbriata — Brigadier-General F. Accardo

Major-General V. Biani — Major-General B. Borghetti

Lt.-Colonel R. Cadringher — Lt.-Colonel E. Calarese

Major-General U. Fiori — Lt.-Colonel S. Fisicaro

Brigadier-General L. Gallo — Colonel L. Klinger

Brigadier-General A. Lippi — Colonel L. Marini

Brigadier-General G. Marrama — Colonel U. Nannini

Major-General S. Napoli — Lt.-Colonel A. Novelli

Colonel R. Orsolan — Brigadier-General M. Palmiotti

Colonel C. Pezzani (Technical Branch, ret.) — Major-General C. Ranieri

Lt.-Colonel S. Revetria — Colonel F. Sarlo

Brigadier-General E. Savi — Major-General G. Teucci

Colonel A. Vercelloni

General Napoli, dean of the 25 pilots at the luncheon.

General Italo Balbo at the time of his appointment to the Air Ministry, as seen by the cartoonist Mameli Barbara.

Colonel Cassady, Air Attaché at the U.S. Embassy in Rome.

Signor Codacci-Pisanelli, Italian Defence Minister, replies to Mrs. Luce.

The 20th Anniversary luncheon offered by the U.S.A.F. to participants in Balbo's North Atlantic cruise of 1933. Mrs. Claire Booth Luce, U.S. Ambassadress in Rome, proposes a toast to the Italian veterans.

General A. Urbani, Chief of the Italian Air Staff, in conversation with the American Ambassadress, who was presented with a scale model of an S.55X flying-boat.

Book Reviews

Gas Turbine Analysis and Practice, by Burgess H. Jennings and Willard L. Rogers.—McGraw-Hill Book Company, New York, Toronto, London, 1953 (English, 487 pages, price $8.50 or 64 shillings).

The two authors, professors at the Technological Institute of Northwestern University, Illinois, have made a very thorough job of this comprehensive manual on gas turbine construction.

The reader, who is assumed, however, to have basic knowledge of general mechanics and thermodynamics, is first introduced to the special thermodynamics of the gas turbine and made acquainted above all with the properties of air. The mathematical explanations are supplemented by examples, and illustrative problems, with solutions, are given chapter by chapter. The chapters on theory are followed by a detailed survey of present-day classes of gas turbines, their parts and design features. The book is not devoted exclusively to aircraft power plant, but also deals with stationary power units and locomotive engines. Special attention is paid to compressors, both axial and radial, as well as a number of special compressors (Lysholm compressor and free-piston systems), and a long chapter is devoted to fuels and combustion chambers. Finally mechanical and thermal stresses on critical turbine-plant elements are analysed in detail and illustrated by numerical examples, with special attention to questions of vibration and metallurgy.

Continental European readers will perhaps be a little disappointed that only English measures are used throughout such a useful book, even for temperature figures. The latter—given in degrees Fahrenheit or Rankine (Fahrenheit absolute)—have therefore constantly to be converted by engineers drilled in the metric system. Above all the many tables and diagrams could be rendered much more useful if metric units were added.—Excellent features, however, are the carefully planned management of the material, the numerous illustrations and the extensive index for reference purposes. *A standard work for the professional.* *Ri.*

Moteurs et turbines à combustion interne, by M. Seiliger, published by Dunod, Paris (French, 298 pages, price 2950 francs).

An original feature of this posthumous work by an eminent engineer is that it sets the theory of piston engines alongside that of the gas turbine. The first part, devoted to piston engines, opens with an exact exposé of the thermodynamics of gases and then studies, in parallel, petrol engines and heavy oil engines. The author gives considerable space to the peculiar characteristics of light diesel engines (possible rivals to the turboprops) and examines in particular the problem of fuel injection, describing the difference in technique according to whether the liquid to be injected is heavy oil or petrol. A special chapter deals with methods of constructing aircraft engines (diesel or petrol) of lower specific weights.—The second part discusses gas turbines after describing the essential theory of the thermodynamics of gas flow. The different categories of turbines are reviewed and their various elements described, together with the part each one plays in the functioning of the whole. The system of supercharging piston engines entails devices incorporating exhaust driven turbines or turbo compressors ; the rapid development of gas turbines has brought improvements which can be applied to turbo compressors and enables "compound engines" to be built which offer an excellent solution to the problem of reducing engine weight. The text is supplemented by formulae and tables which make of it a work of high scientific value. *La.*

Turbines à Gaz et Réacteurs by Pierre Lefort. Larousse, Paris (French, 203 pages).

This book, written for the "man in the street", sets out to give him the essential bases for an exact understanding of all power plants of the "reaction" category, namely turboprop, turbojet, pulse jet, ramjet, rocket. In nine clear and meaty chapters the author describes the basic principles, the various types of propulsion units, the part played by the various elements, the problems controlling their design (fuels, construction materials), their possible uses and finally the future of reaction propulsion (atomic reactors). This little book which ignores mathematics beyond the reach of the average reader, is a mine of information which places the secrets of a branch of engineering stil in full evolution within the reach of the general public. *La.*

"*Die Siegerserie.*"—Carl Lange Verlag, Duisburg.

"Die Siegerserie" is a series of plans for model gliders published by the magazine "Der Flugmodellbau" (Aircraft Modelling). The earlier plans for the *Sturm Vogel* glider model (winning model in the 1952 German model flying championships) has now been followed by the *Krähe* glider model (Class A1) by Karlheinz Denzin. The Krähe was one of the three winning models in a contest for the perfect beginner's model.

Plans for the *LA 17* high performance powered model (Class 1) by Herbert Lange, and the *E 4a* high performance captive model by Karl Gnewikow have also been published in the same series. *Ba.*

Nurflügel-Segelflugmodell III C by Lothar Feuker.—Otto Maier Verlag, Ravensburg, 1953 (German, 8 pages with 4 model sheets ; DM 2.—).

These building instructions for the III C flying wing glider model published by Otto Maier in its collection "Spiel und Arbeit" enables the model builder to make a high performance flying wing glider with particularly high take-off safety. The III C has been designed to give the simplest possible structure having the necessary strength and can be built by advanced model builders. *Ba.*

Interkontinentaler Flughafen Zürich, by Dr. E. Altorfer.—Issued to commemorate the opening of Zurich Airport, with a foreword by Dr. P. Meierhans, Head of the Cantonal Building Directorate, Zurich, 1953 (German).

This excellently produced richly illustrated booklet is more effective than a simple history of Zurich—Kloten Airport. The author's experienced pen and the publisher's understanding cooperation have produced a work on airport planning that can be read with profit by all who are interested in questions of air transport and ground organization. *He.*

L'Industrialisation de l'Afrique. By Capitaine de Frégate Ivan Sarton du Jonchay.—Payot, Paris 1953. (French, 344 pages, price 1100 francs.)

A glance at air schedules and route maps for world air services suffices to show the constantly growing importance of the Dark Continent in aviation. American, British, French, Belgian air bases from the Sahara to the Cape. Projects for the evacuation of European arms industry to Africa in the event of war. All this indicates a need for a thorough examination of natural resources, communications, population problems of the Continent. The author, engineer of the *Ecole Normale* and retired Naval officer, by no means restricts himself to "desk work." He has seen much on his numerous travels, and no aviation library is complete without his richly documented study of the industrialization potential of Africa. *He.*

Le Mur du Son, French account of the English film "Sound Barrier David by" Lean and Terence Rattigan, adapted from the English by Michel Mohrt.

The title of this film suggests a purely technical documentary showing design offices, wind tunnels, workshops and the daily life of test pilots. However, the producers have merely used these technical details as background for a human story. The film version was considerably more interesting than this story written from it. *La.*

Books received

Publications of the International Civil Aviation Organization Issued by ICAO (in English, French and Spanish), Montreal 1952-1953 :

Personnel Licensing (Standards and Recommended Practices) ; Annexe 1—3rd edition April 1953—to the Chicago Convention.

Meteorological Codes (Standards and Recommended Practices) ; Annexe 3 to the Chicago Convention.

Aeronautical Charts (Standards and Recommended Practices) ; Annexe 4 to the Chicago Convention.

Operation of Aircraft—International Commercial Air Transport (Standards and Recommended Practices) ; Annexe 6—4th edition May 1953—to the Chicago Convention.

Ocean Station Vessel Manual (Doc. 6926—AN/856/1).

Publications scientifiques et techniques du Ministère de l'Air. Distributed by the Service de documentation et d'information technique de l'Aéronautique, Paris :

No. 278. *Sur l'entretien des oscillations des eaux portuaires sous l'action de la haute mer,* by John S. McNown.

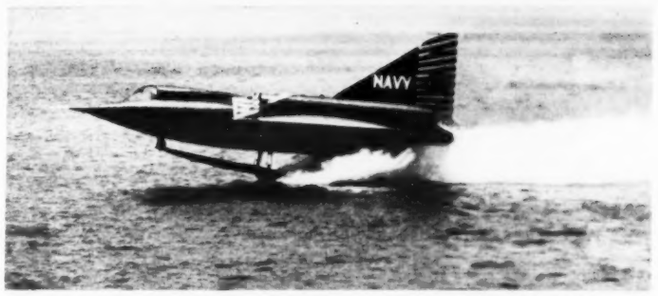
No. 279. *Les autoplissements et les équations intrinsèques des fluides visqueux,* by François-Joseph Bourrières.

THE CONVAIR "SEA DART"

On July 21st, 1953, the Convair XF2Y-1 *Sea Dart* twin-jet delta-wing fighter seaplane, piloted by E. D. Shannon, made a 19-minute demonstration flight to representatives of the press and industry. Our West Coast correspondent, who sent us these pictures taken during the flight, comments as follows :

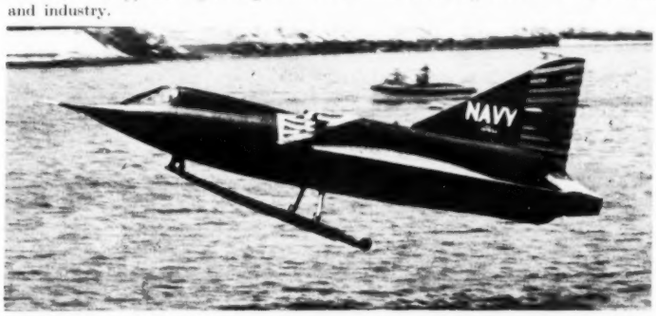
The XF2Y-1—to the best of our knowledge the first fighter seaplane with delta wing and "hydro-skis" ever to be built and flown—needs the full power (with afterburners) of the two Westinghouse J-34 turbojets of 4770 lbs. thrust each to get out of the water and onto its skis . . . a number of take-off attempts failed because the afterburners were not working properly . . . The use of afterburners for take-off appears to be indispensable, at any rate with the engines at present fitted in the XF2Y-1 prototype . . . Time required for take-off roughly 40 seconds, during which time a distance of roughly 2 miles is covered . . . On the other hand, flying performance with hydro-skis and flaps retracted is impressive . . . During alighting—which obviously takes very great flying skill—some five to ten seconds elapse between the moment of touch-down and the reduction to normal gliding speed, and some 880 yards are covered.

The most tricky part of the flight appears to be take-off. However, a second *Sea Dart* prototype (XF2Y-2) with more powerful engines is under development ; it is to have—like the projected production version—two Westinghouse J-40 turbojets of undisclosed version. With this extra power take-off should be less difficult.



Convair XF2Y-1 *Sea Dart*, the first delta-wing fighter seaplane in the world, taking off from San Diego Bay, California.

The *Sea Dart* approaching to alight after a demonstration flight to members of Press and industry.



Performance of the *Sea Dart* with hydro-skis and flaps retracted is impressive.

The *Sea Dart* "taxiing" onto land under its own power.

What's in the Air ? *

AVIATION POLITICS

● New U.S. defence policy and bombing strategy

While the U.S. aircraft industry eagerly awaits the outcome of the study of the missions of the U.S. armed forces by the new Joint Chiefs of Staff, first inkling of their views comes from Admiral Arthur W. Radford, J.C.S. Chairman, who reveals that the U.S. Air Force and Naval Aviation have already taken *steps to "divide up" the possible strategic bombing targets throughout the world.*— Under the earlier "Key West Agreement," the U.S. Air Force was to have responsibility for all strategic bombing, with the Navy to assist only when asked. Radford's announcement appears to indicate that the Navy will now have its own strategic bombing mission, and will get a more sympathetic hearing from the Joint Chiefs of Staff than has been the case during recent years.

● French commercial aviation legislation

Legislation for the re-organization of commercial aviation prepared by the French Ministry for Public Works and Civil Aviation : 1) *Air France to be made into a mixed enterprise company* and to be authorized to ask for private capital, which would enable Government subsidies to be reduced. Subsidies will, however, continue to be given for the operation of unprofitable services of public interest ; 2) *Sharing of the route network between Air France and private companies :* co-ordination of operation and rates, rationalization of air fleet; 3) New rules for landing charges to provide funds for the upkeep and expansion of airports.

SERVICE AVIATION

● R.C.A.F. has 200 Sabres in Europe

The last of the Royal Canadian Air Force's fighter wings equipped with North American F-86 *Sabres* promised to N.A.T.O. was transferred to Germany at the end of August, five months ahead of schedule. With the arrival of the last three squadrons, N.A.T.O. will have over 200 R.C.A.F. *Sabres* in Europe.

● Gruenther praises Norway's contribution

During a visit to Oslo, General Alfred M. Gruenther, Supreme Commander, Allied Powers, Europe, said that Norway's ability to defend the Northern flank of the North Atlantic Treaty Organization defence set-up can no longer be questioned. He particularly singled out the Royal Norwegian Air Force for praise, stating that it is leading all other N.A.T.O. nations in receipt of U.S. military aid with an efficiency rating of 23-24 (the efficiency rating is the average number of hours flown by each aircraft monthly ; the U.S. Air Force rates an index of 24-25).

● Off-shore orders for bilberries

The U.S. Air Force has placed a contract under off-shore procurement with a firm at Tönsberg, Norway, for a supply of $70,000 worth of bilberries. These are particularly rich in carotin (Vitamin A) and are said to be very successful in preventing night-blindness. Experiments carried out during World War II showed that a regular diet of bilberry jam improved vision during night operations.

● Far East B-36 exercise

U.S. Far East Air Force Headquarters in Tokyo have announced that the principal aircraft taking part in the forthcoming air exercises in the Far East will be Convair B-36 ten-engined long-range bombers, several units of which recently flew non-stop from the United States to Yokata AFB near Tokyo.

● New Chief of Staff of the French Air Forces

General Fay has been appointed Chief of Staff of the Armed Forces "Air," in succession to General Léchère who has been put on the retired list.

● Belgian pilot training in the Congo

The Belgian Air Force is transferring its entire advanced flying training organization to Kamina in the Belgian Congo. The whole equipment, including trainers, is being flown out via Rome, Athens and Cairo by 16 C-119F *Packet* transports acquired from the U.S. Air Force.

● Red Air Fleet Day

A total of 424 military jet aircraft took part in the flight demonstration at Tushino Airport, Moscow, on Red Air Fleet Day this year, compared with 182 in 1952.

AIR TRANSPORTATION

● The closing of the American Arctic bases

The decision of the U.S. Air Force to close down its airfields at Shemya, Aleutians, and Cold Bay, Alaska, has confronted Canadian Pacific Air Lines and Northwest Orient Air Lines with new problems. Both carriers call at Shemya on their Far East services and C.P.A. also uses Cold Bay as a re-fuelling point on a substantial number of North Pacific flights. The seriously curtailed budget of the Civil Aeronautics Administration for the 1953-1954 fiscal year precludes C.A.A. operation of either of these airports. No solution has yet been found to the problem.

French honour for American ally : Louis Christiaens, Secretary of State for Air under the French Defence Ministry (back to camera) conferring the Medaille de l'Aéronautique on American Air Force Secretary *Harold Talbott*. Extreme right : *U.S. Air Force General Lauris Norstad*, Commander-in-Chief N.A.T.O. air forces in Europe.

● Oswald Ryan 15 years with C.A.B.

On August 22nd, 1953, Oswald Ryan, Chairman of the Civil Aeronautics Board, celebrated his fifteenth anniversary as Board member. Ryan is the only C.A.B. member to have retained his post ever since the Board was set up by the Civil Aeronautics Act of August 22nd, 1938.

● Growing tourist traffic to Hawaii

United Air Lines has increased its tourist class flights between California and Hawaii from four to eight per week. Pan American World Airways, who had previously doubled their tourist flights between the U.S. West Coast and Hawaii from three to six, have now raised the number to nine. P.A.A. has left the number of its first class services on this route unchanged, but U.A.L. has reduced first class services from twelve to six.

* Extracts from *Interavia Air Letter*, daily international news digest in English, French and German. All rights reserved.

During an *inspection tour of the French Expeditionary Force in Indo-China*, France's new Secretary of State for Air Louis Christiaens took part in a service flight in a Navy carrier-based *Helldiver*. He is here seen being greeted by Captain La Haye, Captain of the *Arromanches*, before the catapult take-off from the aircraft carrier.

Lockheed's 25,000th aircraft, an F-94C *Starfire* jet fighter, being delivered to the U.S. Air Force at Van Nuys Airport, California. The transfer ceremony was attended by Colonel Harrison R. Thyng (centre), Deputy Chief of Staff Operations for the Western Air Defence Force, Burt C. Monesmith (right), Vice-President and General Manager of Lockheed's California Division, and Grace Boeckmann (left), one of the firm's employees who has been named the "Starfire Girl."

● P.A.A. gets increased mail rate for Latin America

The U.S. Civil Aeronautics Board has increased annual mail rates for Pan American World Airways' services to Latin America by roughly $5,000,000 retrospective to January 1st, 1953. The rate now agreed is $13,171,000, of which $11,320,000 is labelled as subsidy by the Government. In its decision the Board said that it was "concerned" with the "high level of subsidy" still required for the Latin American routes, though it recognises P.A.A.'s operating problems in that area.

● K.L.M.'s Super Constellation service to South Africa

K.L.M. Royal Dutch Airlines is opening its twice-weekly Lockheed *Super Constellation* service between Amsterdam and Johannesburg on October 3rd and introducing *Super Constellations* on the twice-weekly Amsterdam-Tokyo service on October 6th. This aircraft type is already in use on K.L.M.'s North Atlantic tourist services and is also to be put on the weekly Amsterdam-Jakarta run some time in 1954.

Saab-29 as reconnaissance aircraft : A Saab S 29C prototype—a reconnaissance version of the Saab-29 jet fighter—recently began flight testing and has been ordered into production for the Royal Swedish Air Force. It is to replace the Air Force's older S 31 reconnaissance type *(Spitfire PR. 19)*.

INDUSTRIAL

● Lockheed's record results

Lockheed Aircraft Corp.'s net profit for the first half of 1953 was $9,000,000, roughly equal to the profit for the corresponding period in 1952 ($9,058,000). Gross income from sales was $389,111,000, compared with $188,629,000 during the 1952 first half.—However, the Corporation's President, Robert E. Gross, reports that after three years of preparation delivery is now "reaching its peak," so that it is difficult to forecast what will be the sales results for the second half of the year.

● Rockefeller leaves Convair

W. C. Rockefeller, a director and Executive Assistant to John Jay Hopkins, Chairman of the Board of Consolidated Vultee Aircraft Corp., has resigned after ten years with the firm and joined Atlas Corporation. He is said to be planning to deal primarily with the direction of the companies created or acquired by Floyd B. Odlum during his association with Convair. Rockefeller is a director of the following undertakings : *Airfleets Inc.*, a marketing and leasing agency for Convair transports ; *The Babb Co. Inc.*, and two of Airfleet's subsidiaries, *Nutt-Shel Co.*, and *Independent Artists* Pictures Inc.

● Svenska Aeroplan profit soars

An impressive illustration of the progress of the Swedish aircraft industry is provided by Svenska Aeroplan AB's annual report for 1952-1953 (July 1st, 1952—June 30th, 1953). Net profit rose from Sw. Kr. 1,950,000 the previous year to Sw. Kr. 7,200,000, and gross operating revenue, prior to depreciation and taxes, from Sw. Kr. 10,550,000 to Sw. Kr. 26,600,000. Reserves for taxes were Sw. Kr. 8,000,000 (1,900,000). The Board proposed a dividend of 8% on Ordinary stock as against 7% the previous year and 5% in 1950-1951.—Svenska Aeroplan shares rose from Sw. Kr. 100 to Sw. Kr. 120 during the 1952-1953 business year.

● Minijet to be built in Holland?

The Dutch firm of NV Koolhoven Vliegtuigen, which is shortly to resume activities, is reported to have acquired a licence for the SIPA 200 *Minijet* light jet aircraft. It is understood that no actual agreement has yet been signed, although negotiations are in progress.

● Distinction for Colonel Rozanoff

Colonel Constantin Rozanoff, chief Test Pilot of Société des Avions Marcel Dassault (makers of the MD 452 *Mystère* swept-wing jet fighter) has been made a Grand Officer of the Legion of Honour.

AIRCRAFT AND POWER PLANT

● The aircraft, car and tractor plants of the Argentine Government concern Industrias Aeronauticas y Mecanicas del Estado are in full swing. The aircraft division has now announced its first new design, namely the I.Ae.35 twin-engined multi-purpose aircraft. This is an all-metal low-wing monoplane for both civilian and military duties (passenger or freight services, pilot and navigator training, practice bomber, ambulance duties, etc.).

The power plant consists of two I.Ae. R-19C El Indio radials of 650 h.p. each, which give the aircraft an economic cruising speed of 215 m.p.h. for a normal gross weight of 12,970 lbs. Range 930 miles.

● Douglas is working on an *XC-133* turboprop-powered high-wing cargo aircraft for the U.S. Air Force. It is to be a four-engined model of about the same size as the Douglas C-124 *Globemaster*.

● The extent of the U.S. Air Force's revived interest in aircraft with propeller turbine propulsion cannot at present be judged, though it is certain that the Air Force has included a turboprop (B-47D) version of the Boeing *Stratojet* bomber in its type programme, in addition to the turboprop models already mentioned. No details are yet available on the B-47D, but it may be assumed that it will have four turboprops (Allison T-40 or Pratt & Whitney T-34?) driving tractor propellers.

● Lockheed Aircraft Corp. has fitted two P2V *Neptune* long-range patrol bombers and sea reconnaissance aircraft (Wright R-3350 *Turbo-Cyclone 18* compound engines of 3250 h.p. each) with two supplementary Westinghouse J-34 turbojets of 3,400 lbs. thrust each for the U.S. Navy. This will increase the power available for take-off by roughly 50% and will enable the type to be operated with considerably higher take-off weight. One of the converted P2V's is a P2V-5 (to be used by Lockheed for experimental purposes) and the other a P2V-6. The latter is to be used by the Navy for an extensive flight test programme (carrier-based operations, etc.).

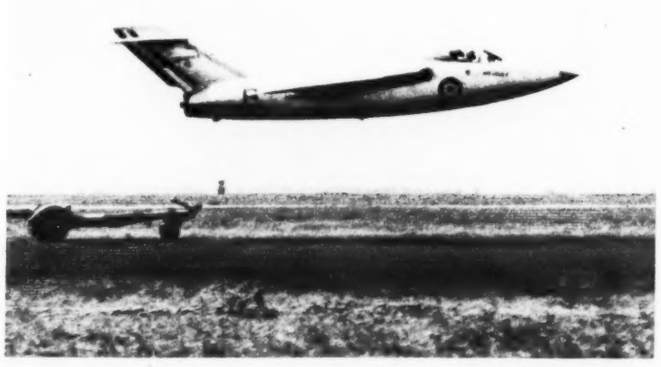
● General Electric Co. announces that its GE J-47 turbojet engine is now authorized for 1,200 hours between overhauls.

NEW CONSTRUCTION MATERIALS

● Henry Wiggin & Co. Ltd., Birmingham, announces a new heat-resistant alloy, *Nimoply 75*, which is particularly suitable for use in turbo engines. Nimoply 75 is a kind of laminated sheet obtained by rolling copper between two sheets of Nimonic 75.

The same firm also announces development of a new acid and corrosion resistant alloy known as *Corronel B*. Composition roughly 66% nickel, 28% molybdenum, 6% iron. It is highly resistant to acids, in particular to hydrochloric acid, sulphuric acid and phosphoric acid.

Baroudeur stands the test : Flight testing of the SE 5000 *Baroudeur* single jet ground attack and interceptor fighter of S.N.C.A. du Sud-Est is continuing intensively at Istres. All tests so far—in particular take-off from the trolley and landing on skids—have gone off to the satisfaction of the pilot and the responsible engineers.



More power for the Neptune : This Lockheed P2V *Neptune* long-range patrol aircraft has been fitted with two Westinghouse J-34 auxiliary jet engines in addition to its two *Wright Turbo-Cyclone 18* compound engines.

Progress Report on U.S. Air Power *

By Chris Roberts, Washington

The United States air forces, probably the dominant single weapon of the free nations of the world, are today undergoing a searching analysis by U.S. military and government leaders. The issue is a simple one : at what precise expenditure does a costly Air Force cease being a protection and become, instead, a grave economic liability ?

The 83rd Congress of the United States has adjourned its first session and left behind it its decisions regarding the proper size of the nation's defences. These decisions provided for the following strengths to be attained in the 1954 fiscal year (July 1st, 1953—June 30th, 1954) :

U.S. Army : 20 divisions, 18 regimental combat teams, 113 anti-aircraft battalions, comprising 1,500,000 personnel.

U.S. Navy : 408 warships, 16 carrier air groups, 800,000 personnel.

U.S. Marine Corps : 3 divisions, 3 air wings, 245,000 personnel.

U.S. Air Force : 120 wings, 960,000 personnel.

The strength levels for the Army, the Navy and the Marine Corps represent long-time goals now attained and are in accordance with decisions of the Joint Chiefs of Staff. But the proposed strength of 120 wings of the U.S. Air Force is very substantially below the 143-wing level established as a minimum by the Joint Chiefs as early as October, 1951.

It is, therefore, of international interest to examine the factors that prompted the people of the United States to defy the considered judgment of their own military experts. The following "time-table" presents the chronological evolution of the 143-wing program :

1945: The peak combat strength of the (then) U.S. Army Air Forces was reached during World War II with 243 combat wings and 105 additional squadrons in service. By fiscal 1947 this force had dropped to 38 combat wings.

July, 1948: The Joint Chiefs of Staff forwarded to the Secretary of Defense a goal of 70 wings for the Air Force.

October, 1948: The Secretary of Defense (Louis A. Johnson) ignored this recommendation and, instead, asked the Joint Chiefs to recommend a program for only 48 wings; they did so because of the imposition of a $5,000,000,000 ceiling on Air Force spending.

October, 1949: The Congress provided funds for a 58-wing Air Force, but on October 29th, 1949, President Truman impounded the additional $730,000,000 voted by the Congress and insisted on an Air Force of 48 wings only.

July, 1950: The Congress approved an authorization for a 70-wing Air Force as the maximum strength permissible for the new Department.

September, 1950: The Congress appropriated funds for a 48-wing Air Force to be equipped with modern aircraft.

September, 1950: After the outbreak of hostilities in Korea, the Congress provided a supplemental appropriation for the Air Force to build up to 58 wings in the framework of the 70-wing program previously authorized.

September, 1950: The Joint Chiefs of Staff presented a revised estimate of the international situation and recommended a 95-wing Air Force by July 1st, 1952, and this new size was approved by the Secretary of Defense, the National Security Council and the President.

January, 1951: A second supplemental appropriation by the Congress provided funds for the Air Force to build towards 68 groups in 1951 and 84 groups in 1952, under the 95-wing program.

May, 1951: In a third provision of additional funds, the Congress voted to increase the Air Force to 87 wings under the 95-wing program.

September, 1951: The Joint Chiefs of Staff recommended a *143-wing Air Force* to be activated during 1953 and to be fully equipped and combat-ready by December, 1954. This was the major decision that has shaped U.S. military policy for the ensuing months since Joint Chiefs of Staff Chairman General Omar N. Bradley said: "In military terms, the year 1954 represents the threshold date at which the Soviet Union will attain the capability of inflicting critical and possible fatal damage to our war-making capacity."

December, 1951: Production program for the 143-wing Air Force was "stretched out" one year and the attainment date line moved up to December, 1955.

January, 1952: Production schedule A-16 was put into effect for the acceleration of aircraft production to equip the 143-wing program.

Since that date aircraft production has repeatedly fallen behind schedule. The original acceleration production schedule, *A-14,* called for a rapid build-up to a production rate of 950 airplanes per month by December, 1952. The program began to lag noticeably by August, 1951, and was replaced by program *A-16* on January 1st, 1952, which reduced the peak rate to 850 airplanes per month and the date of the peak to October, 1953. This schedule *A-16* again began to lag in the middle of 1952 : it provided for deliveries of a total of 6,800 airplanes during 1952 and the first four months of 1953, but actually only 5,380 airplanes were delivered, which represented a production default of 22 percent in total production. On July 1st, 1952, schedule *A-16* was therefore replaced by schedule *A-18,* which reduced the peak to about 825 airplanes a month by March, 1954. This schedule also lagged from the outset and was succeeded by schedule *A-19* on October 1st, 1952, which retained about the same peak but delayed its attainment until May, 1954.

Once again the slippage continued under *A-19,* although at a rate of only 12 percent. As a result, when the new Eisenhower Administration assumed office last January, it repeatedly (in January, March and May) adjusted the program in an attempt to get it down to the vicinity of actual deliveries.

However, this does not mean the U.S. aircraft manufacturing industry has not made enormous increases in its output. For example, the production rate has risen from 150 aircraft per month (with an airframe weight of 2 million pounds) in December, 1950, to 471 per month (5 million pounds) in January, 1952, to 670 a month (8 million pounds) in December 1952 and to 719 a month (9 million pounds) in March, 1953. These are Air Force deliveries only and were accompanied by 78 naval aircraft in December, 1950, 243 in December, 1952, and 264 in March, 1953.

The decision of Defense Secretary Charles E. Wilson to ask the Congress for funds for an Air Force of only 120 wings this year, including 110-114 fully equipped with modern aircraft, was a recognition of his conviction that only enough airplanes can be provided this year to equip that number of wings, regardless of the number of wings authorized or the amount of money made available. He does not believe that 143 modern, fully-equipped wings can be realized before 1957.

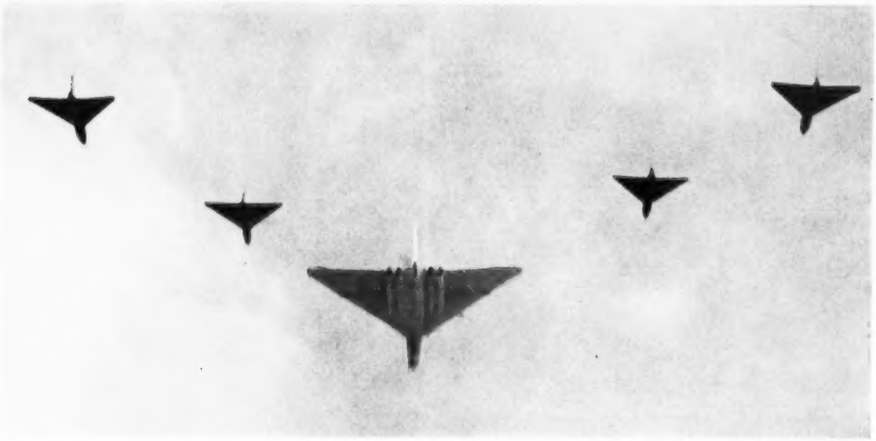
The U.S.A.F. at this writing has only 93 wings fully equipped and ready for combat : in addition, there are 13 wings that lack planned aircraft. Thus, attainment of a full 110-114 wings ready for combat will mean an increase of some 30 percent in Air Force size and strength. This will be accomplished by the scheduled production of 8,800 aircraft with an airframe weight of 118 million pounds during 1953.

Meanwhile, the new Joint Chiefs of Staff under the chairmanship of Admiral Arthur W. Radford are settling down to a review of the rôles and missions of the U.S. forces in the light of new developments in atomic weapons, the international situation and the domestic capabilities of the nation. The resulting final program will be presented to the Congress next January for the fiscal 1955 budget hearings. And most Washington observers believe it will contain very large additional requests for national defense. Until then, the U.S. is maintaining its *status quo* in the international power game.

* Cf. also "Accent on Defence or Sound Economy?"—*Interavia Review* No. 7, 1953, pp. 404-406.

First impressions of the 14th S.B.A.C. Display

Farnborough
September 7th - 13th, 1953



TO QUALITY COMES QUANTITY

In our report on Farnborough last year (issue No. 10, 1952) the theory was expressed that Britain's aircraft industry might be striving for a place in the aviation world similar to that held by Paris in the world of fashion i.e. that of an *aircraft design centre.*

To a certain extent this is still true today, and there are again a number of " new models " to discuss. However, visitors to this year's S.B.A.C. Display will have been struck by the fact that the British industry's top-flight products are no longer available merely in prototype form. This time production versions were on show. This *progress from the experimental to the production stage* was illustrated in that, wherever possible, two or three aircraft of the same type took part in the flying display. For example, two Vickers-Supermarine *Swift Mark 4's* (production version) made their supersonic bangs together, and the Hawker *Hunter Mark 1,* (with reheat) in which Squadron Leader Neville Duke had just set up a new world speed record (727 m.p.h.), was this time accompanied by the *Hunter Mark 2* (with A.S. *Sapphire*) and another Mark 1. Three English Electric *Canberra* light bombers flew, and there were two Avro *Vulcan* heavy delta bombers, each with a different power plant. The formation flight by all five Avro deltas (on one day even six of them) was particularly impressive, and imaginative onlookers likened it to " an invasion from space ".

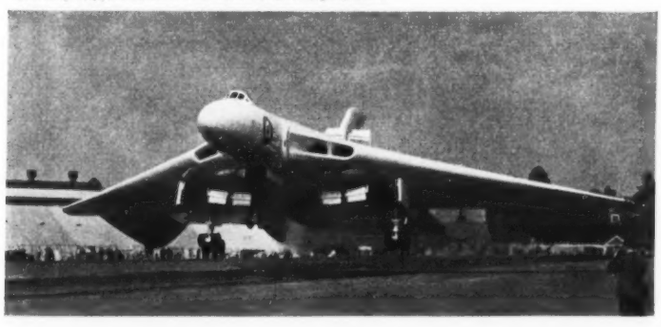
Quality is gradually being joined by quantity and individual performance by series production. This also applies to the new British commercial transports. Many of the visitors from European capitals this time travelled to London in B.E.A.'s *Viscounts,* so that the example of this type demonstrated to them at Farnborough (and borrowed from Air France) was not altogether new to them. A new statistical appendix to the S.B.A.C. programme points out proudly that by the end of the third quarter of 1953 a total of 165 modern British airliners had been ordered and some 30 already delivered. Added to these are the R.A.F.'s substantial military orders (including 215 *Swifts* and a large number of *Hunter F.2*'s) and the Americans' off-shore orders (450 *Hawker F.1*'s and 100 *Sea Hawks*). It is expected that total aircraft exports for 1953 will exceed the £60,000,000 mark for the first time. The labour force employed in the airframe, engine, undercarriage and propeller industry also rose from 149,000 in June, 1950, to 218,000 in June, 1953. No figures are available for the equipment industry and sub-contractors, but it would probably not be far wrong to estimate that roughly the same number of persons are engaged here.

NEW " FLYING MODELS "

What was new at Farnborough this year ? Sceptics who come across the same fifty-odd aircraft types year after year are inclined to overlook the considerable number of new designs and developments mixed among the " old acquaintances ". The harvest of the past year has been by no means a small one, and comprised the following :

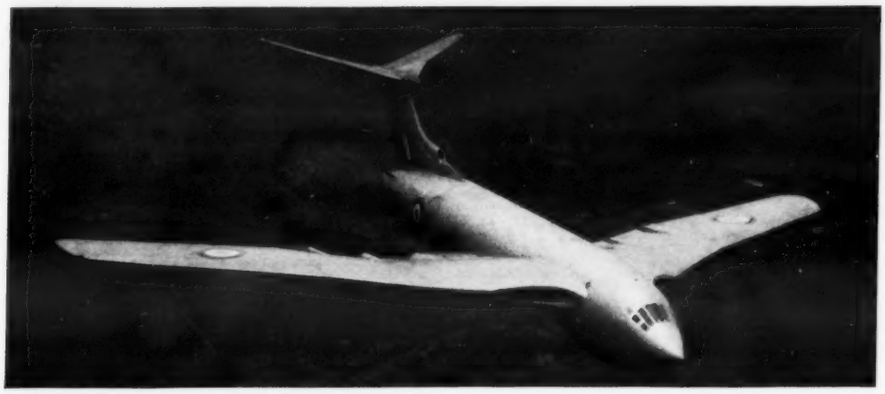
* *Handley Page Victor* prototype : Four-jet crescent-wing bomber with Armstrong Siddeley *Sapphire* ; Super Priority order for the R.A.F.
* *Vickers Valiant B.2* production version ; four-jet bomber with Rolls-Royce *Avons* ; Super Priority order for the R.A.F.
* *Avro Vulcan* second prototype : four-jet delta bomber with Bristol *Olympus* ; Super Priority order for the R.A.F.
* *Avro Shackleton Mk. 2* production version : four-engined patrol and anti-submarine aircraft with Rolls-Royce *Griffon.*
* *Short Sea Mew* prototype : single-engined light anti-submarine aircraft for escort carriers with Armstrong Siddeley *Mamba* propeller turbine.
* *Vickers-Supermarine Swift F.Mk.4* production version : interceptor fighter with Rolls-Royce *Avon* and afterburner ; Super Priority order for the R.A.F.
* *Hawker Hunter F.Mk.2* prototype : interceptor fighter with Armstrong Siddeley *Sapphire* ; Super Priority order for the R.A.F.
* *Gloster Javelin* production version : twin-jet all-weather two-seat fighter with Armstrong Siddeley *Sapphires* and long radar nose ; Super Priority order for the R.A.F.
* *Blackburn and General Aircraft Beverley* production version : four-engined troop transport with Bristol *Centaurus 171s.*
* *Avro 707C* prototype : two-seat delta trainer with Rolls-Royce *Derwent.*
* *Boulton Paul P.111A* research aircraft : delta construction with Rolls-Royce *Nene.*

A. V. ROE & CO. LTD.: The *Vulcan* delta bomber was demonstrated with four Armstrong-Siddeley *Sapphires* and with four Bristol *Olympuses.*



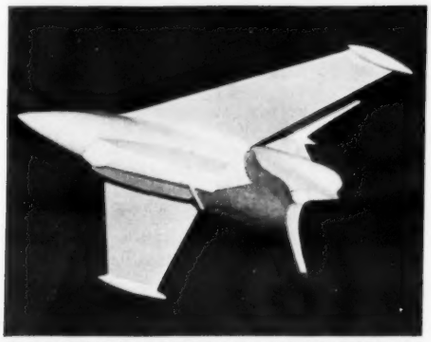
GLOSTER AIRCRAFT COMPANY LTD.: Long-nosed production version of the *Javelin* twin-jet two-seat all-weather fighter (Armstrong Siddeley *Sapphires*).

A.V. ROE & CO. LTD.: Nose of four-engined *Shackleton 2*, with Saunders-Roe Mark 3 life boat.



HANDLEY PAGE LTD.: The *Victor* four-jet crescent-wing bomber (Armstrong Siddeley *Sapphires*) is equipped with leading and trailing edge flaps and large aerodynamic brakes at the end of the fuselage.

VICKERS ARMSTRONGS LTD.: *Valiant B.2* production version (four R.-R. *Avons*) with modified undercarriage.



SAUNDERS-ROE LTD.: Model of a hydro-ski fighter with jet power plant.

SHORT BROS. & HARLAND LTD.: *Sea Mew* light anti-submarine aircraft for escort carriers (A.S. *Mamba*).

* *Short SB.5* experimental aircraft with variable wing-sweep (50°, 60° or 69°) and Rolls-Royce *Derwent*.

* *De Havilland Heron 2* production version : four-engined 14/17 seat feeder liner (retractable undercarriage) with de Havilland *Gipsy Queen 30*.

* *De Havilland Canada Beaver 2* production version : single-engined 7-seat feeder liner and communications aircraft with Alvis *Leonides*.

* *Bristol 173 Mk. 2* prototype : twin-engined twin-rotor commercial helicopter with stub wings for 13 passengers, with Alvis *Leonides*.

Technical data for these new creations —and for the other aircraft shown at Farnborough—are listed in the accompanying *tables*. Impressions of the flight demonstrations will be given in an illustrated report in the next issue (No. 11, 1953).

SHORT BROS. & HARLAND LTD.: Model of the *Sherpa* jet-powered research aircraft, with " aero-isoclinic " swept wing.

PERCIVAL AIRCRAFT LTD. : Model of the P.84 *Jet Provost* trainer *(A.S. Viper)*.

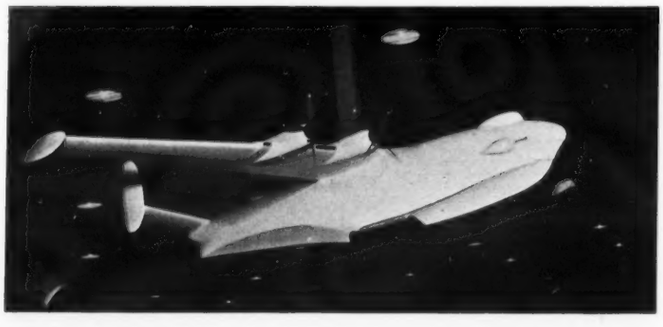
FUTURE PLANS

British aircraft manufacturers' plans and projects for the next few years to come were illustrated to a greater extent than hitherto by scale *models*. In the military field there are four new aircraft designs (two by Saro, one each by Percival and Short) and a number of guided missiles ; in the civil class a whole series of projects covering the following groups : large jet transports ; DC-3 replacements ; commercial helicopters and other rotary-wing types.

Military projects : Saunders-Roe Ltd. showed models of its projected water-ski fighter with retractable skids *(picture)* and of the *Ocean Patrol* flying boat *(picture)* but gave no characteristics or performance figures. *Short Bros. & Harland Ltd.* had a model of their *Sherpa* tail-less research aircraft *(picture)*, a glider prototype of which is already undergoing flight tests and a version fitted with two small turbojets is to make its first flight in a few weeks' time. Designed for experiments in the transonic range and at very high altitudes, the aircraft is to have a

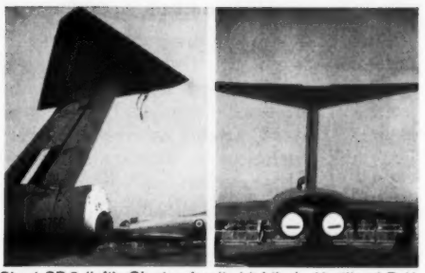
A. V. ROE & CO. LTD.: Defensive posts in the *Shackleton 2* patrol bomber (four R.-R. *Griffons*).

SAUNDERS-ROE LTD.: Model of a four-engined ocean patrol flying boat.



SHORT BROS. & HARLAND LTD.: SB5 research aircraft with variable sweep wing (R.-R. Derwent).

THE DE HAVILLAND AIRCRAFT CO. LTD.: The jet pipes of the D.H.110 two-seat all-weather fighter (R.-R. *Avon*).



Short SB.5 (left), Gloster *Javelin* (right), de Havilland D.H. 110 and and Handley Page *Victor* all have high-set elevator units.

so-called " aero-isoclinic " swept wing, i.e. a wing which despite its sharp sweep maintains the same angle of attack throughout its span under load (high altitude and low speed flight) and thus eliminates the tendency for the flow to break off prematurely. A model of their projected P.84 *Jet Provost* two-seat trainer (A.S. *Viper ASV.5* ; *picture*) was shown by *Percival Aircraft Ltd.*, and *Fairey Aviation Co.* had a group of models of their guided missiles and pilotless aircraft. Finally, a full-sized target aircraft (U.120D) for radio remote control could be seen on *M.L. Aviation Co.*'s stand.

AIR SERVICE TRAINING LTD.: High-speed target aircraft with fixed undercarriage.

Civil projects : In addition to the designs for large jet airliners already seen at the Paris Show (de Havilland *Comet 3*, Vickers V.C.7, Avro *Atlantic*, Handley Page H.P. 97), the designs for aircraft to succeed the Douglas DC-3 were of particular interest. Five British firms are at present working on projects of this kind : *Aviation Traders* (Engineering) Ltd., *(Accountant), Handley Page Ltd.* (H.P.R.3), *Percival Aircraft Ltd.* (P.87), *English Electric* and another firm *(de Havilland ?)*. Further details of these plans will be given in the next issue, and of the equally numerous projects for *commercial helicopters* (Bristol, Fairey, Percival, Saro, Westland).

SERVICE AIRCRAFT

R.A.F. fighters 1-6 ; Naval fighters 7-9 ; Naval strike and anti-submarine aircraft 10-14 ; bombers 15-18 ; transports 19-22 ; experimental types 23-26.

No.	MAKER and Type	POWER PLANT (Take-off power)	SPAN (ft. ins.)	LENGTH (ft. ins.)	WING AREA (sq. ft.)	FIRST FLIGHT
1	DE HAVILLAND *Venom FB.1*	1×D.H. *Ghost* (1×5000 lbs)	41 9	31 10	279	2.9.49
2	DE HAVILLAND *Venom NF.3*	1×D.H. *Ghost* (1×5000 lbs)	41 9	35 3	279	—
3	GLOSTER *Javelin FAW.1*	2×A.S. *Sapphire* (2×8300+lbs)	52	57	900+	26.11.51
4	HAWKER *Hunter F.1* [1]	1×R.-R. *Avon* (1×6500+lbs)	33 7	45 9	app. 300	20.7.51
5	HAWKER *Hunter F.2*	1×A.S. *Sapphire* (1×8300+lbs)	33 7	45 9	app. 300	30.11.52
6	VICKERS-SUPERMARINE *Swift F.4*	1×R.-R. *Avon*+reheat (1×9500 lbs)	32 4	41 6	app. 300	1.8.51
7	DE HAVILLAND *Sea Venom NF.20*	1×D.H. *Ghost* (1×5000 lbs)	41 9	35 3	279	1951
8	DE HAVILLAND D.H.110	2×R.-R. *Avon* (2×7000+lbs)	51	52	app. 550	26.9.51
9	HAWKER *Sea Hawk F.1*	1×R.-R. *Nene 4* (1×5000 lbs)	39	39 7	278	31.8.48
10	A.V. ROE *Shackleton B.2*	4×R.-R. *Griffon* (4×2450 h.p.)	120	87 4	1421	17.6.52
11	FAIREY *Firefly AS.7*	1×R.-R. *Griffon* (1×2450 h.p.)	44 6	37 11	—	27.5.51
12	FAIREY *Gannet AS 1*	1×A.S. *Double Mamba* (1×2950 h.p.)	54 4	43	—	29.9.49
13	SHORT *Sea Mew SB.6*	1×A.S. *Mamba* —	55	41	—	23.8.53
14	WESTLAND *Wyvern S.4*	1×A.S. *Python* (1×4000+h.p.)	44	42	355	Summer 49
15	ENGLISH ELECTRIC *Canberra B.2* [2]	2×R.-R. *Avon* (2×6000+lbs)	64	65 6	960	13.5.49
16	HANDLEY-PAGE *Victor B.1*	4×A.S. *Sapphire* (4×8300+lbs)	—	—	—	24.12.52
17	A.V. ROE *Vulcan B.1* [3]	4×A.S. *Sapphire* (4×8300+lbs)	—	—	—	31.8.52
18	VICKERS-ARMSTRONGS *Valiant B.1*	4×R.-R. *Avon* —	114 4	108 3	—	18.5.51
19	AUSTER *Ambulance Freighter*	1×Blackburn *Bombardier* (1×180 h.p.)	37	24 8	190	1951
20	BLACKBURN *Beverley C.1*	4×Bristol *Centaurus 171* (4×2480 h.p.)	162	99 2	2916	14.6.53
21	PERCIVAL *Pembroke C.1*	2×Alvis *Leonides* (2×550 h.p.)	64 6	46	—	20.11.52
22	SAUNDERS-ROE *Princess*	10×Bristol *Proteus 2* (10×3700 h.p.)	219 6	148	5100	22.8.52
23	A.V. ROE 707A/707B	1×R.-R. *Derwent* (1×3500 lbs)	34 2/ 33	44 9/ 41 10.5	—	July 51/ Sept 50
24	SHORT SB.5	1×R.-R. *Derwent* —	30 6	47 4	—	2.12.52
25	BOULTON PAUL P.111A	1×R.-R. *Nene* (1×5000 lbs)	33 6	26 1	—	—
26	BRISTOL *Olympus-Canberra*	2×Bristol *Olympus* (2×9750 lbs)	64	65 6	960	5.8.52

TRAINERS AND CIVIL AIRCRAFT

Civil and military trainers 27-33 ; airliners 34-41 ; helicopters 42-46.

No.	MAKER and Type	POWER PLANT (Take-off power)	SPAN (ft. ins.)	LENGTH (ft. ins.)	WING AREA (sq. ft.)	FIRST FLIGHT
27	AUSTER *Aiglet Trainer*	1×D.H. *Gipsy Major 1* (1×130 h.p.)	32	23 2.5	app. 163	1951
28	AVRO 707C	1×R.-R. *Derwent* (1×3500 lbs)	—	—	—	1.7.53
29	BOULTON PAUL *Sea Balliol T.21*	1×R.-R. *Merlin 25* (1×1245 h.p.)	39 4	35 1.5	250	1951
30	DE HAVILLAND *Chipmunk T.10*	1×D.H. *Gipsy Major 10* (1×145 h.p.)	34 4	25 8	172	1947
31	DE HAVILLAND *Vampire Trainer T.11*	1×D.H. *Goblin 3* (1×3300 lbs)	38	34 5	262	15.11.50
32	GLOSTER *Meteor T.7*	2×R.-R. *Derwent 8* (2×3500 lbs)	37 2	43 6	350	19.3.48
33	PERCIVAL *Provost T.1*	1×Alvis *Leonides 2500* (1×550 h.p.)	35 2	29	214	23.2.50
34	BRISTOL *Britannia 100*	4×Bristol *Proteus 3* (4×3780 h.p.)	140	114	2055	16.8.52
35	BRISTOL *Freighter 31*	2×Bristol *Hercules 734* (2×2020 h.p.)	108	66 3	1487	2.12.45
36	DE HAVILLAND *Dove 5*	2×D.H. *Gipsy Queen 70-2* (2×380 h.p.)	57	39 4	335	—
37	DE HAVILLAND *Heron 2*	4×D.H. *Gipsy Queen 30-2* (4×250 h.p.)	71 6	48 6	499	—
38	DE HAVILLAND CANADA *Beaver 2*	1×Alvis *Leonides 502/4* (1×550 h.p.)	48	30 3	250	—
39	PERCIVAL *Prince 3*	2×Alvis *Leonides 502/4* (2×550 h.p.)	56	42 10	365	—
40	SCOTTISH AVIATION *Pioneer 2*	1×Alvis *Leonides* (1×550 h.p.)	52 6	34 4	390	Jun. 50
41	VICKERS-ARMSTRONGS *Viscount 700*	4×R.-R. *Dart 504* (4×1515 h.p.)	94	81 2	963	28.8.50
42	BRISTOL 171 *Sycamore 4*	1×Alvis *Leonides 73* (1×545 h.p.)	48 6.75 [6]	61	1860 [7]	1950
43	BRISTOL 173 Mk.2 [5]	2×Alvis *Leonides 73* (2×545 h.p.)	48 6.75	78 2	3720	3.1.52
44	SAUNDERS-ROE *Skeeter 5*	1×Blackburn *Bombardier 704* (1×180 h.p.)	32	31 2	804	Oct. 48
45	WESTLAND S-51	1×Alvis *Leonides 521/1* (1×550 h.p.)	48	57	1810	1948
46	WESTLAND S-55	1×Alvis *Leonides Major* (1×870 h.p.)	53	41 8.5	2206	—

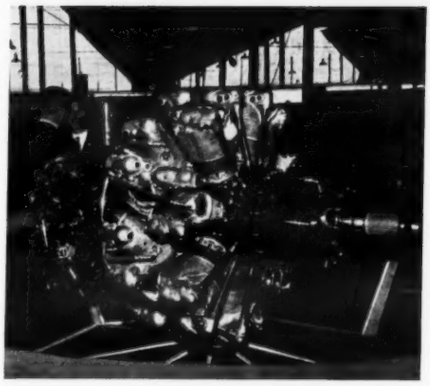
Notes :

[1] Two *Hunter F.1s* with Rolls-Royce *Avon* were shown; one model, however, was fitted with an afterburner Avon. — [2] A version of the *Canberra* with two Rolls-Royce *Avon RA.14s* of 9,500 lbs take-off static thrust each (converted by Rolls-Royce from the standard Canberra B.2 type) was also to be seen ; a Canberra PR.3 version is used as photo reconnaissance aircraft. — [3] *Vulcan* prototype originally powered by Rolls-Royce *Avon* ; production version is to have four Bristol Olympus engines ; — [4] With 60° sweep back. — [5] The Bristol 173 helicopter shown was a Mark 2 experimentally fitted with the stub wings designed for the production version (Mark 3) ; the Mark 3 has two Alvis *Leonides Majors* as power plant. — [6] Diameter of main rotor(s). — [7] Rotor area.

NEW ENGINES

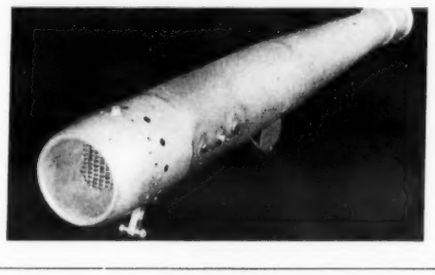
Lack of space unfortunately makes it impossible to go into details of the latest versions of well-known British turbojets, propeller turbines, piston and compound engines. Instead, a table showing the latest data and performance figures issued by S.B.A.C. for these engines has been included. It will be seen that performance and fuel consumption have been improved in almost every case.

The only really new engines shown at Farnborough this year were the 14-cylinder Alvis *Leonides Major (picture)* two-row radial for aircraft and helicopters, a 44 lb. thrust pulse-jet by *Saunders-Roe (picture)* and the de Havilland *Super Sprite* bi-propellant (" hot ") rocket engine for hydrogen peroxide and kerosene (or petrol) developed from the " cold " *Sprite*. Data and performance figures for these engines are given in the table. Mention should finally be made of the pressure ramjets and pulse-jets developed by *Fairey* to drive the rotor blades of large combined aircraft.



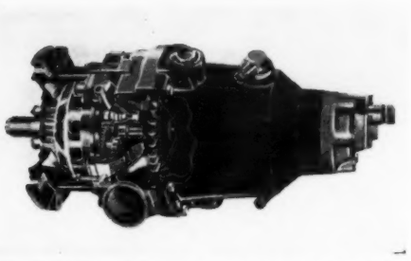
ALVIS LTD.: *Leonides Major* 14-cylinder 870 h.p. two-row radial engine.

SAUNDERS-ROE LTD.: Pulse-jet of 44 lbs. thrust to drive helicopter rotor blades.



PROPELLERS AND POWER PLANT ACCESSORIES

De Havilland Propellers Ltd., one of Britain's two leading propeller manufacturers, showed a collection of propeller blades, of either light metal or hollow steel, for engine powers of 100 to 8,000 h.p. *Rotol Ltd.* was again represented by its electrically de-iced four-bladed propellers for the Vickers *Viscount*'s turboprops *(Dart)* already seen in Paris, and by controller units, feathering pumps and synchronization equipment.



THE PLESSEY COMPANY LTD.: LTSA 70 liquid fuel starter for gas turbines, with 70 h.p. starter power (Iso-Propyl-Nitrate).

Among the large number of power plant accessories manufacturers mention should be made of *Plessey Company*, who have brought out a liquid fuel starter for turbine engines *(picture)*. Designed for a starter power of roughly 70 h.p., the apparatus uses a relatively cheap combination fuel (Iso-Propyl Nitrate) which is non-toxic and not shock-sensitive. The starting process begins with an air pump supplying air to the combustion chamber for scavenging processes ; then fuel is added, ignited by a high-frequency ignition system and dilated in a single-stage turbine. Later fuel decom-

ENGINES

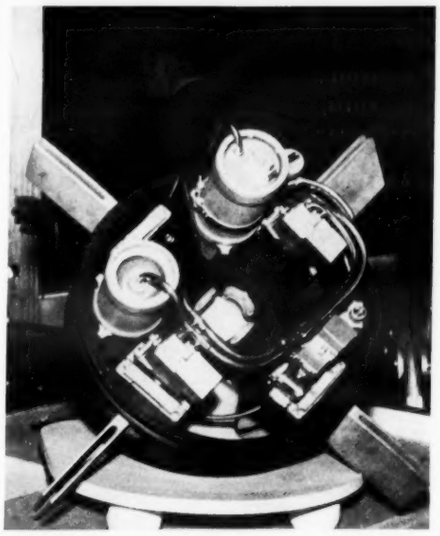
Piston engines 1-11 ; propeller turbines 12-17 ; turbojets 18-25 ; rocket engines 26-27 ; compound engine 28 ; pulse-jet engine 29.

No.	MAKER AND TYPE	TAKE-OFF POWER hp*	TAKE-OFF POWER lbs	TAKE-OFF POWER r.p.m.	LENGTH ins.	DIAMETER or BREADTH X HEIGHT ins.	DRY WEIGHT lbs	COM-PRESSION RATIO	CRUISING CON-SUMPTION	PURPOSE
1	Alvis *Leonides LE.23HM*	550	–	3200	41.5	41.5×32.8	642	6.8	31.5 gph	Westland S-51 : Bristol 171 and 173
2	Alvis *Leonides 502/4*	550/570	–	3000	54.4	41.5×41.5	790	6.8	38 gph	Percival *Provost* and *Pembroke* ; Scottish Aviation *Pioneer* ; D.H. *Beaver*
3	Alvis *Leonides Major*	870	–	3000	70.9	38.9	1060	6.8	57 gph	Westland S-55
4	Blackburn *Cirrus Bombardier*	180	–	2600	45.3	17.2×31.5	354	7.0	10.8 gph	Auster *Ambulance/Freighter* ; Saro *Skeeter*
5	Bristol *Centaurus 661*	2600	–	2500	74.6	57.75	3300	7.2	108.5 gph	Various civil and military types, incl. Hawker *Sea Fury*, Airspeed *Ambassador*
6	Bristol *Hercules 730*	2040	–	2800	62.25	52	2100	7.0	75 gph	Bristol 170 *Freighter* (Hercules 734)
7	De Havilland *Gipsy Major 10/2*	145	–	2400	45.4	20.1×30.6	312	6.0	11 gph	D.H. *Chipmunk* ; Auster *Aiglet Trainer*
8	De Havilland *Gipsy Queen 30/2*	250	–	2500	61.5	19.6×33	560	6.5	13 gph	De Havilland *Heron*
9	De Havilland *Gipsy Queen 70/2*	380	–	3000	71.75	19.6×33.2	670	6.5	17.5 gph	De Havilland *Dove*
10	Rolls-Royce *Griffon 57*	2450	–	2750	83.5	–	2100	6.0	118 gph	Avro *Shackleton* ; Fairey *Firefly 7*
11	Rolls-Royce *Merlin 35*	1280	–	3000	75	33.6×49.1	1515	–	112 gph	Boulton Paul *Sea Balliol*
12	Armstrong-Siddeley *Mamba*	1320	+405	15000	87.3	29	771	5.35	·67 lb/ehp.h	Short SB.6 *Sea Mew*
13	Armstrong-Siddeley *Double Mamba*	2640	+810	15000	98.7	52.8	2000	5.35	·67 lb/ehp.h	Fairey *Gannet*
14	Armstrong-Siddeley *Python*	3670	+1150	8000	122.7	54.5	3150	5.35	–	Westland *Wyvern*
15	Bristol *Proteus 3*	3320	+1200	12000	100.5	39.5	2810	7.2	–	Bristol *Britannia*
16	Napier *Eland*	3000	(ehp)	–	104.5	36.1	1575	–	–	–
17	Rolls-Royce *Dart RDa.3*	1400	+365	14500	95	38.5	929	5.5	·94 lb/ehp.h	Vickers-Armstrongs *Viscount*
18	Armstrong-Siddeley *Sapphire*	–	8300+	–	133.85	35.25	2500	–	–	Gloster *Javelin* ; Avro *Vulcan* (1st prototype) ; Handley Page *Victor* ; Hawker *Hunter F.2* ; experimental installation in English Electric *Canberra*
19	Armstrong-Siddeley *Viper ASV.3* [1]	–	1640+	–	65.5	24.7	365	–	–	Government Aircraft *Jindivik 2*
20	Bristol *Olympus* [2]	–	9750+	–	124	40	3520	–	·766 lb/lbt.h	Avro *Vulcan* (2nd prototype) ; experimental installation in English Electric *Canberra*
21	De Havilland *Ghost 50*	–	5000+	10250	121	53	2218	4.5	1.33 lb/lbt.h	De Havilland *Venom* and *Sea Venom*
22	De Havilland *Goblin 35*	–	3500+	10750	100.5	49.9	1629	3.3	1.16 lb/lbt.h	De Havilland *Vampire Trainer*
23	Rolls-Royce *Avon RA.7* [3]	–	7500	–	110	42.2	2460	–	app. 1.0 lb/lbt.h	English Electric *Canberra* ; Vickers *Valiant* ; Hawker *Hunter F.1* ; Supermarine *Swift F.1* ; D.H.110 and *Comet 2*
24	Rolls-Royce *Derwent 8*	–	3600	14700	83	43	1280	4.19	1.45 lb/lbt.h	Gloster *Meteor T.7* ; Avro 707A, B and 707C
25	Rolls-Royce *Nene*	–	5000	12500	97	49.5	1755	4.0	1.43 lb/lbt.h	Hawker *Sea Hawk* ; Boulton Paul P.111A
26	Armstrong-Siddeley *Snarler*	–	2000	–	–	–	215	–	–	–
27	De Havilland *Super Sprite*	–	4000	–	–	–	600	–	–	–
28	Napier *Nomad NNm.6*	3135	(ehp)	–	119	–	3580	–	–	–
29	Saunders-Roe *Pulse-jet*	–	45	–	47.5	5.5	15.5	–	–	–

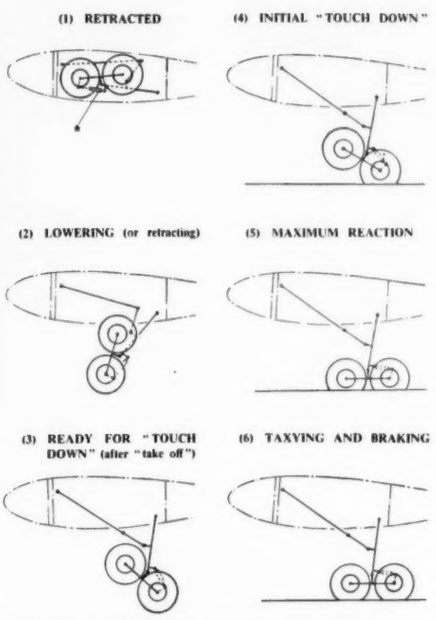
Notes : The figures given in this table are based on Society of British Aircraft Constructors' releases for the 14th S.B.A.C. Display. — [1] Short-life engine ; ASV. 5 long-life version for Percival P.84 *Jet Provost* trainer under development ; latest version, ASV. 6, delivers 1,900 lbs. take-off static thrust ; — [2] Two-spool engine. — [3] *Avon RA.7R* version with afterburner delivers 9,500 lbs.

poses under the heat effect of the combustion chamber and requires no further oxidizer or ignition. Cost per start is only about 4 shillings.

Other power plant accessories : A selection of high-power pumps and fuel systems *(Spill system)* was shown by *Dowty Equipment Ltd.*, whilst Sir Alan Cobham's *Flight Refuelling Ltd.* offered a number of new valves and hose couplings for the probe-and-drogue system and for pressure refuelling. *Joseph Lucas (Gas Turbine Equipment) Ltd.* exhibited their fuel pumps, control systems and valves for turbojet engines, which are produced in many countries under licence, as well as a number of new designs. The two sparking plug firms of *K.L.G. Sparking Plugs Ltd.* and *Lodge Plugs Ltd.* (makers of igniter plugs and temperature gauges for gas turbines), the carburettor firm of *H.M. Hobson Ltd.*, the filter firm of *Tecalemit Ltd.* and *British Ermeto Corp.* (couplings), *British Emulsifiers Ltd.* (jettison tanks) and *Rotax Ltd.* (starters, etc.) should also be mentioned.



BRITISH MESSIER LTD.: Hydraulic servo unit for guided missiles. Lower right: electro-hydraulic transfer valve which transfers the small signals from the receiver amplifier (0.1 Watts) into hydraulic pressure (4,000 p.s.i.) to actuate the control surfaces.


(1) RETRACTED
(4) INITIAL "TOUCH DOWN"
(2) LOWERING (or retracting)
(5) MAXIMUM REACTION
(3) READY FOR "TOUCH DOWN" (after "take off")
(6) TAXYING AND BRAKING

ELECTRO HYDRAULICS LTD.: The main undercarriage units in the *Victor* bomber (eight tyres each) turn about themselves during retraction and lowering, to take up a minimum of space. The tilting is done by the shock absorber jack unit marked with an asterisk, which also provides optimum shock absorption on touch-down (4).

UNDERCARRIAGES AND HYDRAULIC SYSTEMS

British Messier Ltd. sister-firm to the well-known French manufacturers, was showing its latest shock-absorbing undercarriage designs (for the Short SB.6 and another undisclosed aircraft type) as well as wheel brakes, hydraulic pumps and control valves for 4,000 p.s.i. systems. The effort to reduce weight by increasing pressures from their previous maximum of 3,000 p.s.i. to 4,000 p.s.i. is characteristic of almost all British hydraulic firms. A particularly interesting item was a hydraulic servo unit for guided missiles *(picture)*, in which the stored hydraulic power at 4,000 p.s.i. sets in motion the control surface actuators with the aid of an electrically-controlled transfer valve (small power signals of 0.1 Watts).

In *Dowty Equipment Ltd.*'s undercarriage legs with *Liquid Spring* shock absorbers (for *Vulcan, Hunter, Sea Hawk* and *Javelin*) the Dowty high pressure sealing gland, which has been under development for some years and forms the key part of these designs, could be examined at closer quarters. How much lighter and more compact the Liquid Spring shock-absorber is than the usual pneumatic type could be seen from the main undercarriage unit for the *Vulcan* delta bomber *(picture)*, which has a single shock-absorbing cylinder in the centre of the wheel group. Another point that should be mentioned is the outstanding reliability of the Liquid Spring which needs practically no maintenance. Another of Dowty's masterpieces, the Vardel 5050.Y hydraulic pump, has a maximum pressure of 4,000 p.s.i. and delivers 5 gallons per minute at 3,000 r.p.m. For the given pressure it needs a power of 14 h.p.

A third large undercarriage manufacturer, *Electro-Hydraulics Ltd.*, showed its new four-wheel main undercarriage with double tyres for the *Victor* bomber *(picture)* and demonstrated how this unit turns about itself during retraction and can thus be housed in a relatively thin wing. The two main wheel units and the nosewheel together take up only 3 % of the bomber's take-off weight. Electro-Hydraulics also exhibited a large number of pumps, valves and power control installations, in particular for the *Swift* jet fighter.

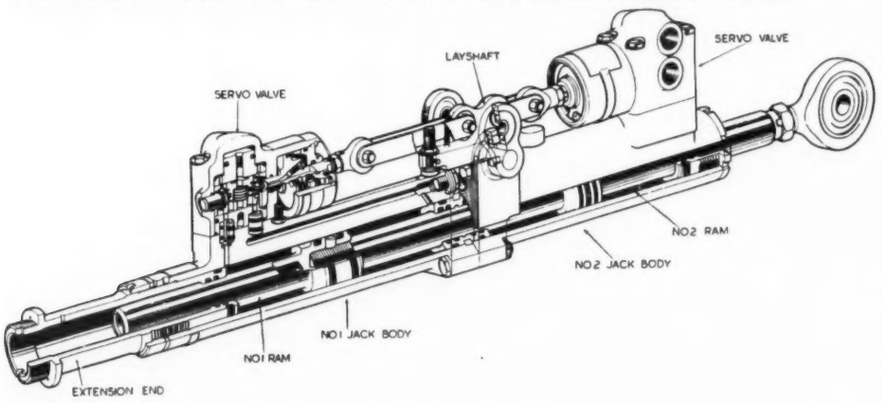
Other undercarriage and hydraulic firms : Tyres, wheels, brakes, retraction mechanisms and skid preventing automatic brakes were shown by *Dunlop Rubber Co. Ltd.* and *Goodyear Tyre and Rubber Co. Ltd.*, with the former also exhibiting pneumatic equipment, anti-G equipment, wind-screen wipers and anti-icing equipment. Other firms included *Lockheed Hydraulic Brake Co. Ltd.* (hydraulic parts and servodyne power controls), *Integral Ltd.* and *Plessey International Ltd.* (hydraulic pumps, actuators, parts for powered and automatic controls) and, finally, *Ermeto* and *Joseph Lucas.*

POWERED CONTROLS, AUTOPILOTS, INSTRUMENTS, CABIN EQUIPMENT

From hydraulics to *power-boosted controls* is only a step, as practically all powered controls today work on hydraulic energy. Mention should be made primarily of *Boulton Paul Aircraft Ltd.*'s powered control systems, the result of six years of work, and *Fairey Aviation Co.*'s single and tandem jack *Hydro-boosters (picture)*, which are particularly reliable and safe (with reversion to manual control when necessary). *H.M. Hobson Ltd.* also now make powered controls for manned or unmanned aircraft.

In the field of *automatic pilots and gyroscopic equipment*, mention should be made not only of the standard products shown by the two old-established firms of *Smiths Aircraft Instruments Ltd.* (S.E.P. 2 automatic pilot) and *Sperry Gyroscope Co. Ltd.* (Zero Reader, Gyrosyn compasses and electric gyro horizons, various types of Gyropilot) but also of those of *Elliott Bros. Ltd.* In addition to the miniature stabilizer for yawing oscillations shown in Paris (cf. issue No. 8, 1953, page 387) there was an automatic pilot developed in conjunction with R.A.E. for the Australian *Jindivik* pilotless target

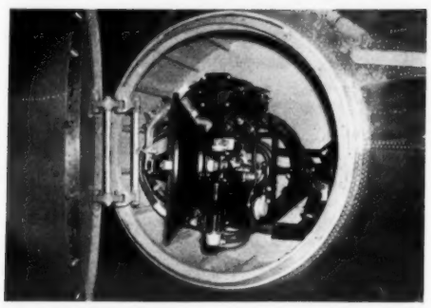
THE FAIREY AVIATION COMPANY LTD.: The tandem jack version of the *Hydrobooster* for powered controls with independent left and right hydraulic circuits. (If both circuits fail, controls can be operated manually.) The control column is connected via rods and levers to the common layshaft of the two servo valves for forward and rear jacks.



DOWTY EQUIPMENT LTD.: The eight-wheel main undercarriage unit for the *Vulcan* heavy bomber has a single Liquid Spring shock absorbing cylinder (rear), while the telescopic strut has no shock absorber.

BURNDEPT LTD.: The TALBE (Talk And Listen Beacon Equipment) VHF emergency transmitter (and receiver) for life jackets automatically transmits signals when the aerial is extended. These are picked up by the VHF homing equipment in the rescue aircraft. R/T conversations are possible over a distance of 20 miles.

FERRANTI LTD.: Mark 4 electric gyro horizon.



EKCO ELECTRONICS LTD.: Airborne search radar in the nose of a De Havilland *Comet 1A*.

DECCA RADAR LTD.: Displays and control unit of the Type 424 airfield control radar.

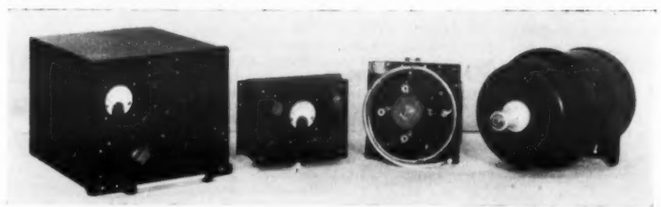
aircraft. *Ferranti Ltd.* had its new Mark 4 electric gyro horizon on show *(picture)*.

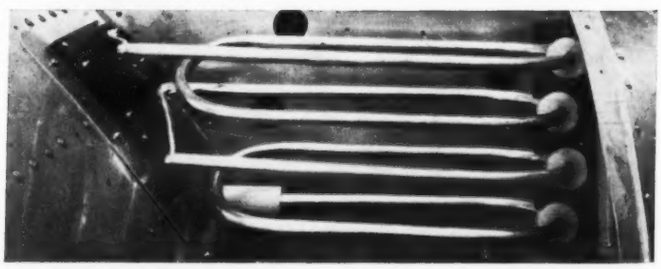
Cabin pressure equipment and oxygen systems were demonstrated in particular by *Normalair Ltd.*, who had 32 sectioned items on show, including the oxygen pack used by the Everest Expedition. *Sir George Godfrey & Partners* and *de Havilland Propellers Ltd.* are also active in this field, the latter with licence equipment from Hamilton Standard Division of United Aircraft. Finally, there was *Lancefield Aircraft Components Ltd.*'s lightweight double seat for Comet passengers, which weighs only 14 lbs. (without upholstery), a new record value.

*

DECCA RADAR LTD.: Type 424 mobile airfield control radar for fighter bases and small civil airports.

EKCO ELECTRONICS LTD.: Suppressed aerial HF system, consisting of selector, controller, matching and tuning units (top) and aerial inductive coupling (bottom). The aircraft skin acts as aerial.





ELECTRICAL EQUIPMENT, RADIO AND RADAR

The most striking exhibits among the low-frequency equipment were the AC and DC motors, generators and actuators (for linear movement) offered today by the firms of *British Thomson-Houston Ltd.*, *English Electric Co.*, *Plessey International Ltd.*, *Western Manufacturing (Reading) Ltd.*, and *Westinghouse Brake & Signal Co.* Besides these, mention should be made of voltage regulators (British Thomson-Houston), *Sen Ter Cel* selenium rectifiers for aircraft electrical systems (Standard Telephones and Cables Ltd.) and airport lighting equipment (General Electric Co. and Standard).

*

The collection of radio and radio navigation equipment shown this year was particularly extensive :

Burndept Ltd. had normal radio equipment in the VHS and UHF bands for aircraft and dinghies and an interesting rival equipment to the SARAH miniature homing transmitter (by Ultra Electric Ltd.) described in our last issue (No. 9, 1953, page 536 etc.). The apparatus *(picture)*, also designed for use in Mae Wests, is designated TALBE (Talk And Listen Beacon Equipment). It consists of a VHF beacon transmitter with two-way R/T equipment. The automatic signals transmitted by the beacon can—according to the makers—be picked up by the rescue aircraft from an altitude of 5,000 ft. and a distance of 50 miles by means of a new (American) Standard VHF homing apparatus, while the R/T equipment enables two-way communications to be maintained up to a distance of 20 miles.

EKCO Electronics Ltd. (E.K. Cole) showed an airborne search radar of small dimensions *(picture)*, and a suppressed aerial system for high-speed aircraft and its selector, controller, matching and tuning units *(picture)*. EKCO also makes mobile airfield approach aids for military airfields. *Cossor Radar Ltd.* produced a new (miniature) *Gee* Mark III, which weighs only 66 lbs. and works on ten frequencies between 20 and 85 mc/s., also portable oscillographs and radio valves.

Decca Navigator Company presented a new light-weight version of their well-known *Flight Log*, weighing only 15 lbs. It consists of a small box with a transparent map on which the aircraft's track and position are traced. Decca Navigator Company is also advertising a new method of long range air navigation known as the DECTRA System, which could be introduced on routes such as Dakar-Natal/Recife to support the projected Comet Mk. 2 services, if airlines—B.O.A.C. in particular—were sufficiently interested. The sister-firm of *Decca Radar Ltd.* demonstrated its mobile airfield control radar Type 424 *(picture)* in operation. Designed for fighter bases and small airfields, the equipment—with two displays—gives a very good picture of the airfield and its approaches and enables the landing rate of fighter units to be considerably increased. Scanner rotation speed 24 r.p.m., carrier frequency 1000 c/s, peak power 30 kW, normal range 20 miles, altitude up to 9,000 ft. For higher-flying aircraft the beam can be swung 12° upwards.

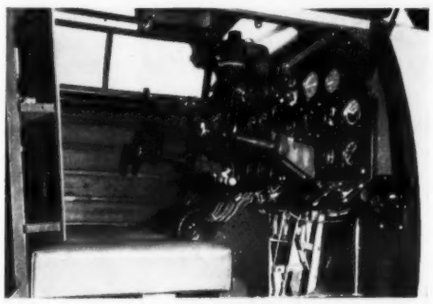
Marconi's Wireless Telegraph Co. Ltd. was represented by VHF, MF and HF communications and D/F equipment and by a control desk. *Murphy Radio Ltd.* showed R/T and DME equipment, while *Plessey Company* demonstrated light VHF transmitter-receivers for six frequencies, and *Pye Ltd.* VHF ground stations, portable VHF R/T, infra-red spectrometers, and multiplex links. R/T equipment in the VHF and HF ranges was also shown by *Redifon Ltd.* and *Standard Telephones & Cables Ltd.* Among these Standard's 100-channel HF airborne transmitter-receiver deserves mention. Finally *Ultra Electric Ltd.* was showing its *SARAH* miniature homing transmitter already described in these pages (cf. No. 9, 1953, p. 536 etc.).

SAFETY EQUIPMENT

In this category mention should be made not only of the personnel and braking parachutes of *Irving Air Chute of Great Britain Ltd.* and the life jackets and dinghies of *R.F.D. Company Ltd.* but also of *Martin-Baker Aircraft Company*'s Standard Mark 2 ejection seat, with which most British high-speed aircraft are fitted. A mobile ejection seat training rig outside the tent entrance aroused considerable interest, and there were many visitors who could not resist the temptation of trying it out and getting a bird's eye view of the exhibition ground from a height of some 20 ft.

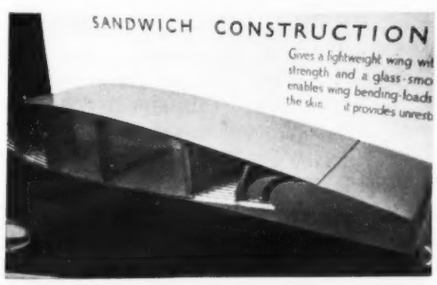
Details of Martin-Baker Ejection Seat *Mark 2*: Ejection angle 24° to 30° (aft from vertical); ejection velocity 60 ft./sec.; height of seat 52 ins.; width 21.5 ins.; weight approx 50 lbs.

EKCO ELECTRONICS LTD.: Mobile approach aid equipment (operated by one man) on standard R.A.F. van. It combines VHF D/F with radar indication of aircraft's altitude and distance.



AIR TRAINERS LTD.: Internal equipment of the AT.100 instrument trainer for twin-engined aircraft (dual control).

P. FRANKENSTEIN & SONS LTD.: Pressure suit for high altitude flight (and Martin-Baker ejection seat).



HANDLEY PAGE LTD.: Light-weight sandwich construction proposed for wing of H.P.R.3.

P. Frankenstein & Sons (Manchester) Ltd. showed the Beaufort life jacket for B.O.A.C. and B.E.A. passengers, also pressure waistcoats combined with oxygen equipment, designed for British bomber crews, and finally a high-altitude partial pressure suit for test flights *(picture)*. Space is lacking to give details of the thirteen firms which make de-icing equipment or the five makers of fire prevention equipment, though mention should be made of the *Graviner Manufacturing Company*'s " Firewire " which immediately detects any outbreak of fire in an aircraft.

OTHER ITEMS

No new armament was revealed to the public this year, though a number of older rocket projectiles were to be seen on the wings of R.A.F. fighter-bombers and of the *Wyvern* propeller-turbine naval strike aircraft, and *Ferranti Ltd.* was showing its latest gyro gunsights, the Mark 4E and Mark 5. Camera and ciné-guns were exhibited by *W. Vinten Ltd.* and *Williamson Manufacturing Company.*

*

A new pilot training apparatus on view was the two-seat dual control AT.100 made by *Air Trainers Ltd. (picture)*, which is designed for instrument training of pilots of twin-engined aircraft (e.g. *Convair-Liner*).

*

Finally, a word on a number of items of interest to the *production engineer:* a signal pistol made experimentally of titanium by *M.L. Aviation Company* proves that this " material of the future " can be machined with precision. *Bristol Aeroplane Company* showed their jettison tanks made of durestos (an asbestos phenolitic material) and the swept wing for a guided missile of the same material. *Aviation Traders Ltd.* demonstrated their tensioned skin system of fuselage construction. *Short Bros. & Harland Ltd.* had a portion of a wing stiffened by corrugated sheet Reduxed to the outer skin, and a glass cloth ventral drop tank. *Hordern-Richmond Ltd.* were showing their jigs and tools of compressed wood (Hy-du-lignum) and glass laminates.

Handley Page Ltd. showed an example of their new sandwich-like construction for wings *(picture)* which, the makers claim, provides high strength with particularly smooth surface.

*

The *Ministry of Supply*, as " host of Farnborough ", showed a cross-section of its wide-spread activities and illustrated a new telemetry system for guided missiles, a frequency plus amplitude modulated system. Cameras for night photography and solid propellant rocket motors were also on show.

IFS
COLLINS' INTEGRATED FLIGHT SYSTEM

by Franz BAUMGARTNER,
Engineering Department, Swissair, Zurich

Collins Radio Company, Cedar Rapids, Iowa, recently completed the testing of their Integrated Flight System, which has now been officially released for use in commercial aircraft. Swissair is the first airline in the world to try it out on regular long-range services. The following is a report on this new development by Swissair's responsible engineer.

Editors.

A glance at the history of commercial aviation shows that since very early days every effort has been made to find technical means of meeting air transport rules for safety and economy, and of mastering the problem of approaching to land in bad weather. These efforts led even before World War II to the development of the *Instrument Landing System*, which has contributed very considerably to the expansion of air transportation.

As is known, the *ground equipment for I.L.S.* consists of a group of directional beam transmitters set up in the approach path and on the airport : 1) *Localizer transmitter* which provides a vertical plane of reference in the direction of the runway ; 2) *Glide path transmitter*, which gives a slightly inclined plane leading to the beginning of the runway ; 3) *Three marker beacons* to indicate distances. —*In the pilot's cabin* a cross-pointer instrument shows whether the aircraft is left or right of the vertical plane, and above or below the glide path plane, the extent of the needle deflection indicating the distance from the reference planes. Visual and audible signals tell the pilot when he is flying over the marker beacons.

The new *Integrated Flight System* (or *I.F.S.*) also shows the pilot the aircraft's position, attitude and heading in relation to the reference planes. It uses the same ground transmitters as I.L.S., but the cross-pointer, direction indicator and banking indicator are *replaced by two new instruments, which give the pilot not only the same readings as the three old instruments but also the corrections to be made.*

During the actual approach phase the pilot need concentrate on one instrument only. This indicates the track which the aircraft must follow to reach the line of intersection between the localizer and the glide path planes (beam). As will be shown, this track can be chosen in such a way that the aircraft approaches the beam *asymptotically*, so that the characteristic oscillations of aircraft equipped with conventional I.L.S. instrumentation about the beam are eliminated.

A procedure which gives this type of steering instructions is designated a *semi-automatic system.* It is based on the detection of deviations from the ideal asymptotic path, by means of feedback control. A linear addition of the lateral displacement, heading and banking signals gives the control corrections.

Principle of a semi-automatic approach system and determination of the approach path.

The path of an aircraft approaching the beam can be represented by projection into vertical and horizontal planes. Its projection into the latter can be expressed mathematically as a function $y = f(t)$, where y is lateral displacement from the beam and t time *(fig. 1)*. As the aircraft's lift, weight and centrifugal force vectors must always be in balance, the aircraft's banking angle (φ)

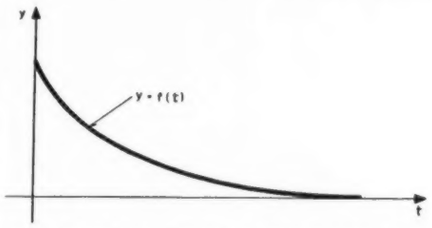


Fig. 1. : Projection of flight path in glide path plane. Axis t represents the beam, i.e. the line of intersection of the vertical and the glide path planes.

depends on the (variable) radius of curvature of its path. The direction of flight at any given moment is determined by angle ψ— between fuselage axis and beam.

The *localizer receiver* on board the aircraft measures lateral deviation y (which is a function of the distance between transmitter and receiver), while the gyroscopic horizon gives angle φ, and the compass gives angle ψ. It is assumed here that the aircraft is moving in a horizontal or only slightly inclined plane. Moreover, there should be no wind and no change in approach speed U.

Fig. 2 shows a simplified feedback control diagram applicable to semi and fully-automatic systems. This installation consists of three measuring devices ; i.e. localizer receiver E_y, gyroscopic horizon E_φ and compass E_ψ, as well as mixer R and servo motors S_Q and S_S. Ailerons (deflection δ) and rudder (deflection ϵ) are both actuated by the servo motors. The response of the aircraft to these deflections is measured by E_y, E_φ and E_ψ and hence closes the feedback loops.

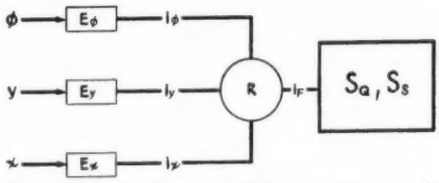


Fig. 2. : Diagram of semi and fully automatic approach systems.

In the three signal measuring devices y, φ and ψ are converted into currents i_y, i_φ and i_ψ, which are proportional to the quantity measured. The mixer adds up these currents according to the simple equation :

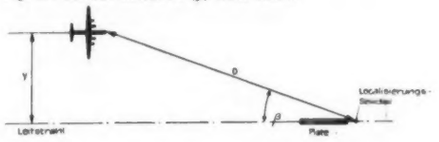
$$i_y + i_\varphi + i_\psi = i_F \qquad (1)$$

Mixer output current i_F , representing an error, then acts on servo motor S_Q (which produces an aileron deflection δ) and on servo motor S_S (which effects a corresponding rudder deflection ϵ). Allowing for the proportionality between current and signal the above equation (1) becomes :

$$K_1 y + K_2 \varphi + K_3 \psi = i_F \qquad (2)$$

Variable y is given by the signals interpreted by the localizer receiver and shown on the cross-pointer instrument as angle β. According to *fig. 3*, $Y = D.\ sin\ \beta$. As, in the arrangements common today, an angle β of $2\frac{1}{2}^0$ corresponds to a full scale deflection on the instrument, $y = D.\ \beta$ can be taken as sufficiently accurate.

Fig. 3. : Lateral deviation (y) from beam.



Variables φ and ψ can be obtained as shown in *figs. 4 and 5* for an aircraft moving in a horizontal plane at constant speed U : the aircraft moves from m to m'. The acceleration vector falls in the perpendicular to the path and is

$$p_n = \frac{U^2}{R} = \frac{1}{R}\left(\frac{ds}{dt}\right)^2$$

Fig. 4 also shows that d ϑ equals $d\psi$, so that—when $ds = Rd\vartheta = Rd\psi$—the distance covered in time dt can be obtained.

For *fig. 5* however, the equilibrium condition is $G \sin\varphi = Z \cos\varphi$. As φ is small, $\sin\varphi \sim \varphi$ and $\cos\varphi \sim 1$ or,

$$G\varphi = Z$$

Moreover :

$$Z = \frac{G}{g} p_n = \frac{G}{g}\frac{1}{R}\left(\frac{ds}{dt}\right)^2 = \frac{G}{g}\frac{1}{R}\frac{R\,d\psi\,ds}{dt^2}$$

$$= \frac{G}{g}\frac{d\psi}{dt} U$$

$$Z = G\varphi = \frac{G}{g}\frac{d\psi}{dt} U$$

$$\varphi = \frac{U}{g}\frac{d\psi}{dt} \qquad (3)$$

Fig. 4 also gives the equation

$$U \cos(90 - \psi) = \frac{dy}{dt} = U \sin\psi$$

As ψ is small, $\sin\psi \sim \psi$ and hence :

$$\psi = \frac{1}{U}\frac{dy}{dt} \qquad (4)$$

$$\frac{d\psi}{dt} = \frac{1}{U}\frac{d^2y}{dt^2}$$

By combining this equation with (3) we get :

$$\varphi = \frac{1}{g}\frac{d^2y}{dt^2} \qquad (5)$$

This gives angle φ and ψ as functions of y. Substituting their values in formula (2) we get :

$$K_1 y + \frac{K_2}{g}\frac{d^2y}{dt^2} + \frac{K_3}{U}\frac{dy}{dt} = i_F \qquad (6)$$

Current i_F keeps the control surface servo motors in motion until the value of i_F coincides with the setting of the mixer. If we take the latter to be constant or, for the sake of simplicity, to be equal to zero, (6) becomes :

$$\frac{d^2y}{dt^2} + a_1\frac{dy}{dt} + a_2 y = 0 \qquad (7)$$

The solution to this equation gives the ideal path to fly. We have here the well-known *linear differential equation of second degree with constant co-efficients*, which plays a large part in mechanical and electromagnetic control problems. Depending on the value of the co-efficients it has *two solutions*, one of which represents the *aperiodic case* and the other *an oscillating system* with decreasing amplitude. In order to obtain the desired asymptotic approach to the vertical plane (aperiodic case) the constants must fulfill the following conditions :

$$\frac{a_1^2}{4} - a_2 > 0$$

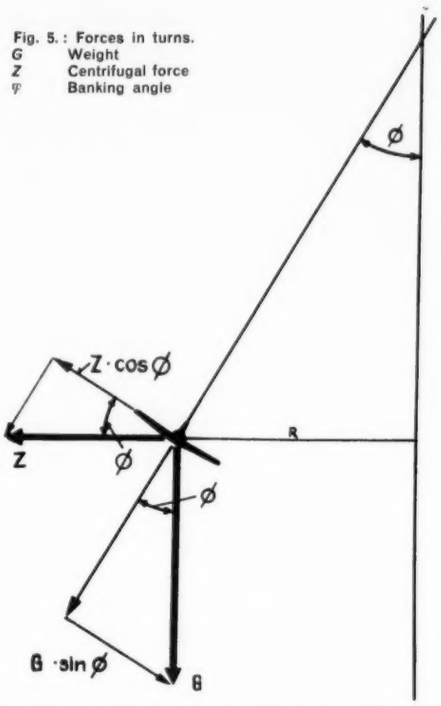


Fig. 5. : Forces in turns.
G Weight
Z Centrifugal force
φ Banking angle

The most general solution to the differential equation is then

$$y = a \text{ expon.}\left(-\frac{a_1}{2} + \sqrt{\frac{a_1^2}{4} - a_2}\right)t$$

$$+ b \text{ expon.}\left(-\frac{a_1}{2} - \sqrt{\frac{a_1^2}{4} - a_2}\right)t$$

A graph representing this function shows different types of curves depending on the coefficients. The most favourable curve in which time of flight to the vertical plane is a minimum, is obtained with critical damping (see *fig. 1*).

Practical Application

In practice, however, the curve can only be followed approximately, as the system only gives control corrections when an error in deviation from the setting of the mixer occurs. As the current i_F acts on the servo motors and control surfaces of the aircraft, its functional connection with y depends on the operational characteristics of these parts. Consideration of the operating behaviour of the whole regulating system—from the initial to the correcting signals—leads to a linear differential equation of the fourth degree, whose solution indicates the true path of the aircraft to the vertical plane and serves as basis for the stability investigation of the system. Expressed as a graph, this solution gives a flight path with minor oscillations—the amplitude of which depends on the sensivity of the servo system—which leads asymptotically into the beam.

Finally it should be stressed once more that *fig. 2* represents a basic system for an automatic installation in which—unlike Collins' system—the pilot's actions are not taken into consideration. Wind influence is also ignored. However, it can be proved that these factors do not affect the nature of the final equation.

Fig. 4. : Geometrical determination of flight path.
m Aircraft
b, l, n Right-angled axes
$\vec{b}, \vec{l}, \vec{n}$ Vectors of right-angled axes
ϑ Angle of rotation
ψ Angle between fuselage axis and beam
R Radius
U Speed
s Track covered

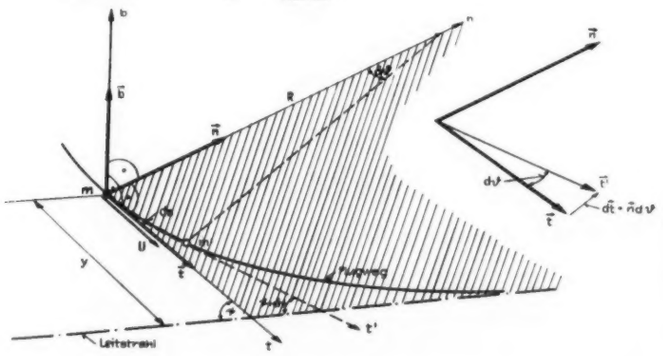
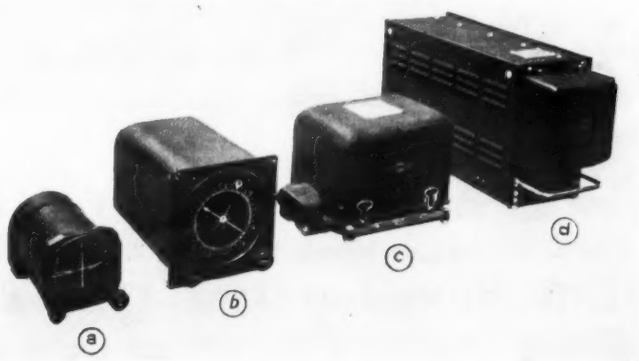


Fig. 6. : Components of the I.F.S. installation.
a Approach horizon
b Course indicator
c Vertical gyro
d Computor



In its practical version the Integrated Flight System installation in the aircraft comprises the following parts *(fig. 6)* :

(a) Approach horizon ;
(b) Course indicator ;
(c) Vertical gyro ;
(d) Computor (corresponds to mixer in *fig. 2*).

These parts can be fitted in modern commercial aircraft without major modification to the aircraft.

Prospects of I.F.S.

In Collins' system the course indicator and approach horizon provide position, attitude information and heading, as well as corrective instructions. During the final approach phase the approach horizon becomes the primary source of information for the pilot. He concentrates mainly on one indicator, his " steering needle ". This needle must be kept constantly in zero position, regardless of the magnitude of the displacement, crosswind being automatically compensated for. The aircraft is then guided on an asymptotic curve to the line of approach. The installation is, therefore, a valuable aid to the pilot during the critical phase of every flight, as he would otherwise have to interpret the three signals, y, φ and ψ and hence a differential equation. *Flight into the glide path plane is of a similar nature.*

Apart from bad weather landing approaches, I.F.S. enables notable *improvements to be made in en route navigation*. Its integrated instrumentation shows the pilot a map-like picture of the aircraft's position and heading relative to the selected course.

Consideration of the possibilities in landing approach opened by this equipment raises the question of whether present-day bad weather minima could not be reduced. A marked increase in the regularity of air transport would be the result. There would also be a reduction in the number of missed approaches, which would increase safety and economy. Finally, the efficiency of this approach system would also be a major factor in determining the fuel reserves to be carried.

On the debit side are, of course, the not inconsiderable purchase and maintenance costs. The weight of the installation—roughly 26 lbs.—would reduce payload to a small extent only.

Even with the new Collins system, the development of approach systems has by no means come to an end. The continuous increase in the work capacity of modern aircraft calls for constant development and adaptation of approach procedures. Needless to say, no final verdict can be given until I.F.S. has been thoroughly tested in regular airline operation.

Bibliography : S. G. Anderson and E. H. Fritze : " Instrument Approach System Steering Computer ", Proceedings of the I.R.E. Vol. 41, No. 2, February 1953.

The mind of Mr. Reader...

Dear Sir,

In last month's issue of " Interavia " we read a report of a lecture given by Mr. W.E. Petter in connection with light weight aircraft.

We would like to draw your attention to a mis-statement in this paper, namely, Mr. Petter's statement to the effect that the SAAB Ejector Seat is 50% lighter than the Martin-Baker Ejector Seat. This remark can only apply to our old type seats which were designed over six years ago. Our new light weight Automatic Seat, which was shown at the S.B.A.C. Display this month, weighs only 50 lb. : it is probably the lightest Ejection Seat of its kind in the world.

In the same article an illustration appears showing the pilot with upraised hands, as though he were presumably intending to operate a face screen. If this is so, we would point out that a face screen is in fact used for firing the Martin-Baker Ejector Seat and is a Patent Martin-Baker feature, covered by patents throughout the world.

Yours faithfully,
James MARTIN,
Managing Director and Chief Designer
MARTIN-BAKER AIRCRAFT, CO. LTD.,
Higher Denham, near Uxbridge, England.

No direct mention was made by Mr. Petter of the Martin-Baker ejection seat. His exact words were " the seat formerly used "—Editors.

Gentlemen :

20th Paris Aircraft Show

On page 311 in the issue devoted to the above, I read with great interest the paragraph concerning the COANDA biplane exhibited at the 1910 Paris Salon. Your sister publication " Flight " carried an allusion to this exhibit with an actuel photograph of the aircraft upon its stand at the show. I believe it was in an issue about 18 months ago.

For your information HENRI COANDA is very much alive and as full of original thought as he was in the early 1900's. He lives in Paris at 81 Blvd. St. Michel and if anyone on your staff would care to spend a happy afternoon, I cannot think of a better way than spending it with Dr. Coanda. The " EFFET COANDA " is slowly and surely becoming better understood by those who should have understood it years ago and it is interesting to see its use taking place in such things as agricultural sprayers and machines for the conversion of salt water into fresh water. Also, its use in the exhaust systems of internal combustion engines. In the latter case, it actually creates a vacuum and turns a wasted stroke into one of power. The same system may be used for an omni-purpose carburettor using at will without readjustment, heavy oil, petrol, kerosene, and even fish oil. If the EFFET COANDA was carried through to its full extent it would make most of the world's largest refineries completely redundant.

If Leduc used the " Effet " maybe his aircraft would not need mothering to XXX metres ?

I hope this is of interest to you.

Yours truly,
A.W. GUINNESS,
Le Lavandou—Var, France, Hotel Jetée.

BCPA **THE ONLY ALL-SLEEPER SERVICE**
between North America - Australia or New Zealand
BRITISH COMMONWEALTH PACIFIC AIRLINES LIMITED
HEAD OFFICE : 53, MARTIN PLACE, SYDNEY, AUSTRALIA, OR 347, STOCKTON STREET, SAN FRANCISCO, TEL. YUKON 2-3670

SOCIÉTÉ D'EXPLOITATION DES MATÉRIELS

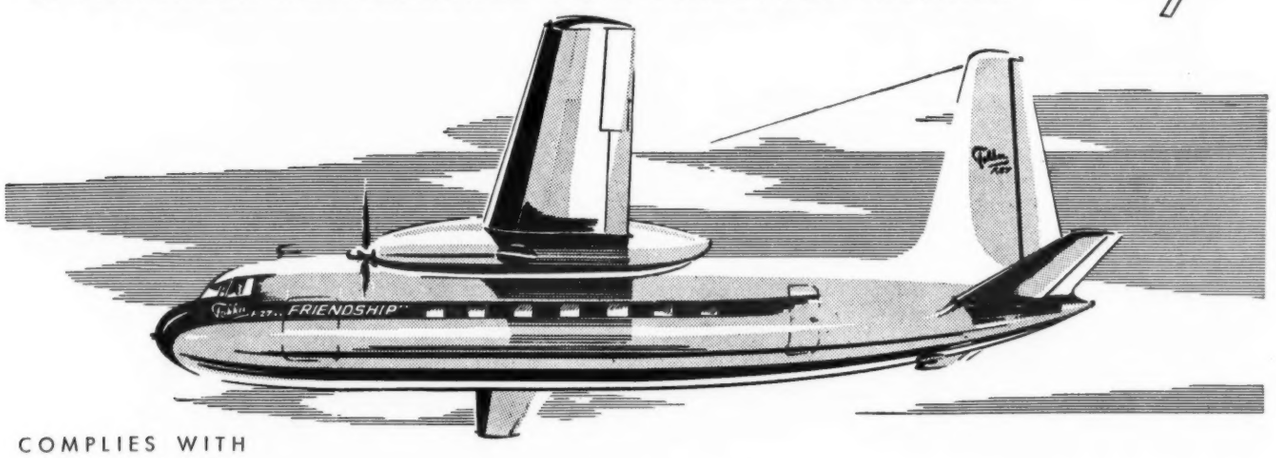
HISPANO SUIZA

RUE DU CAPITAINE GUYNEMER - BOIS-COLOMBES - SEINE

JET ENGINES
AIRCRAFT ENGINES
DIESEL ENGINES
ALUMINIUM FOUNDRY

FOKKER F.27 *Friendship*

28-PASSENGER MEDIUM-RANGE TWIN-TURBOPROP AIRLINER

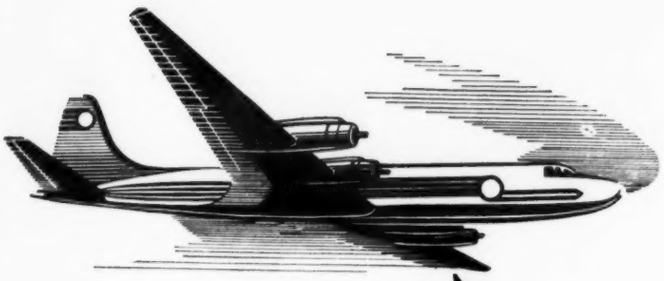


COMPLIES WITH
ICAO
REQUIREMENTS

ECONOMICAL IN USE AND CHEAP IN MAINTENANCE

ROYAL NETHERLANDS AIRCRAFT FACTORIES

Fokker



TAI

The Big French Private Airline has put into Service an Aircraft which Meets all your Needs

TAI

the Super DC 6

DOUGLAS DC-6B

COMFORT

SPACIOUS CABIN
LARGE WINDOWS
QUALITY SERVICE

RELAXATION

COMPLETE ABSENCE OF VIBRATIONS FLIGHT AT HIGH ALTITUDE IN CALM ATMOSPHERE, RESTFUL SURROUNDINGS

ECONOMY

Fast Journeys, over 300 m. p. h.
TWO CLASSES ON BOARD
* **Tourist Class, 50 pullman seats**
* **1st Class, 20 super-comfortable seats**

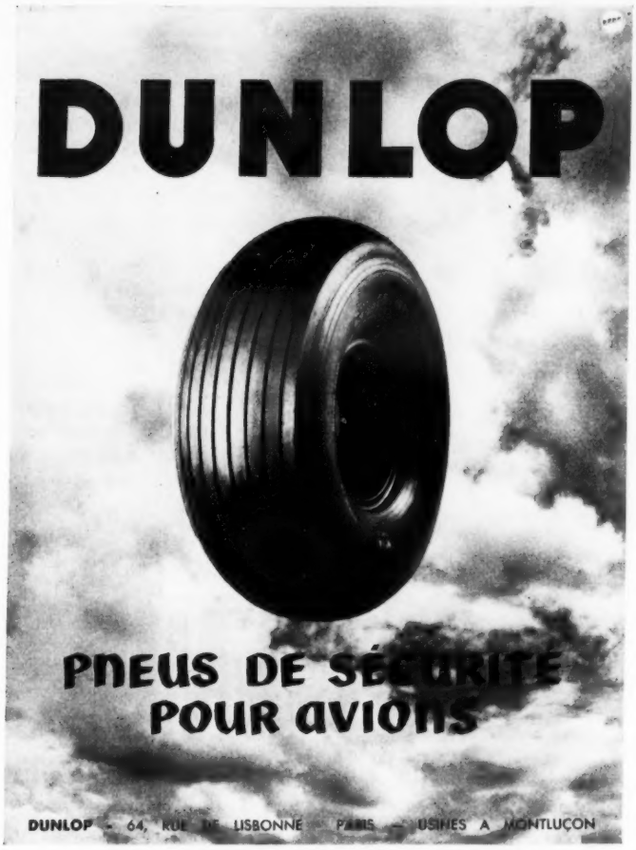
TAI

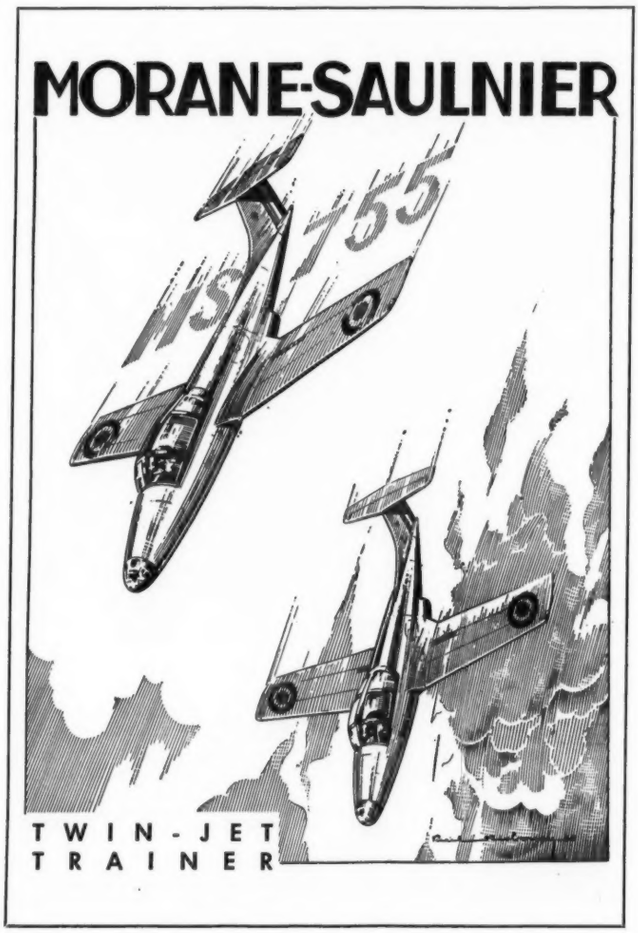
at your Service throughout the FRENCH UNION :

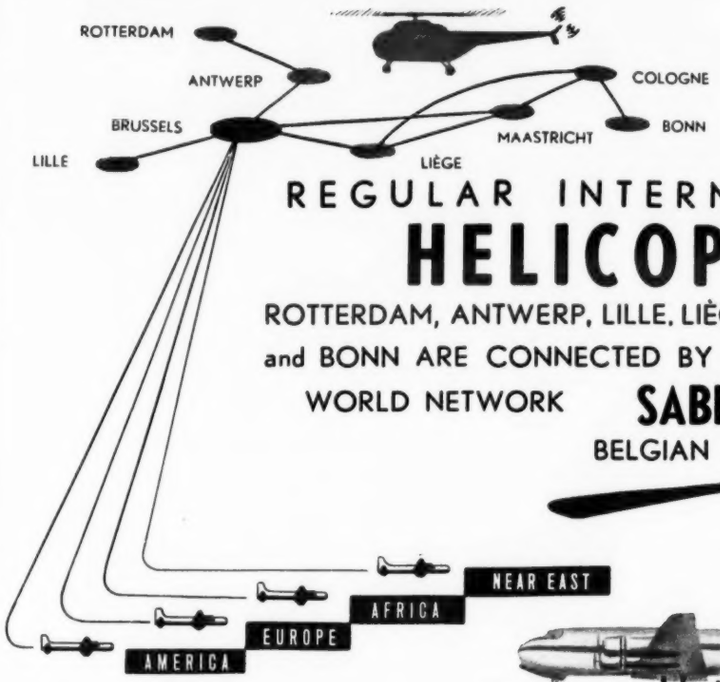
French North Africa,
French West Africa,
French Equatorial Africa,
Somaliland,
Madagascar,
Indochina

YOU WILL BE DELIGHTED WITH A TRIP BY *Super DC 6*

COMPAGNIE DE
TRANSPORTS AÉRIENS INTERCONTINENTAUX
23, RUE DE LA PAIX - PARIS 2e
TICKETS ON SALE AT YOUR TRAVEL AGENCY







FOR THE FIRST TIME IN THE WORLD

REGULAR INTERNATIONAL LINES BY

HELICOPTERS

ROTTERDAM, ANTWERP, LILLE, LIÈGE, MAASTRICHT, COLOGNE and BONN ARE CONNECTED BY **HELICOPTERS** WITH THE WORLD NETWORK **SABENA**

BELGIAN AIRLINES

PARIS*MARSEILLES*GENEVA*TOULOUSE*MULHOUSE*LYONS

CIE GLE

DE TRANSPORTS AÉRIENS

AIR ALGÉRIE

★

REGULAR SERVICES BETWEEN

FRANCE

AND

ALGERIA

PARIS

4, RUE AUBER - OPE. 02-44

★

ALGIERS

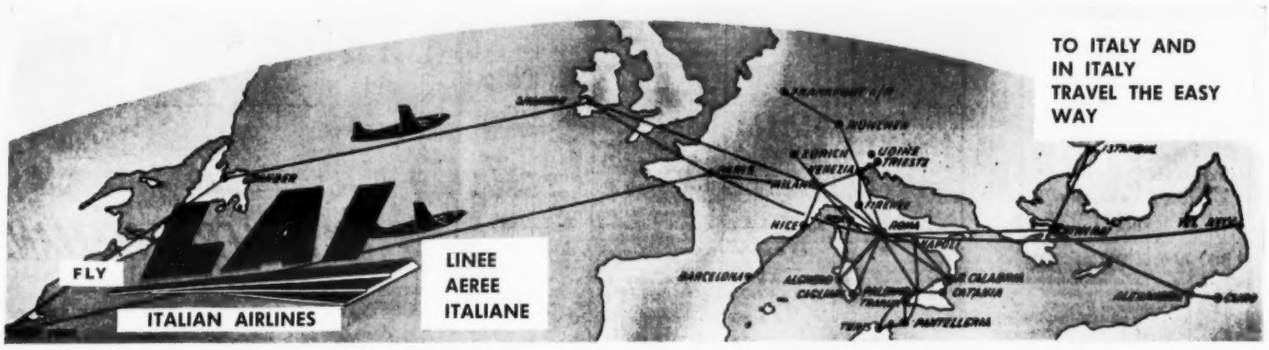
46, BOULEVARD ST-SAENS - TEL. 305-96

★

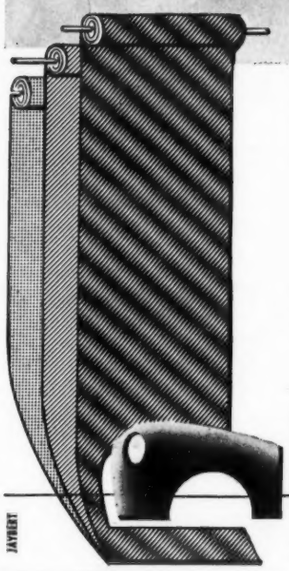
CGTA AA

*DOUGLAS **DC-4** AND **DC-3***

ALGIERS*BONE*PALMA*PHILIPPEVILLE*CONSTANTINE*ORAN



Have you thought
ABOUT REINFORCED PLASTICS, WOVEN GLASS...
THE **VAUTOUR** HAS 8 MAJOR PARTS OF ITS COWLING IN **TEXTIGLASS** ARMOURED PLASTIC



... whenever you have to make shaped parts, of any dimensions, in large or small quantities.

You will find :
the mechanical properties of metals (11,000 to 85,000 lbs/sq. in.),
the chemical qualities of plastics,
electric insulation,
non-corroding.

TEXTIGLASS, makers of glass fibre for reinforcing plastics, are at your disposal for advice on your problem.

"Textiglass"
S. A. **PIERRE GENIN** & Cie
44, Rue Paul Valéry, PARIS 16e
Téléph. PAS. 13-91 (3 lignes)

★ LITERATURE I. A. AND SAMPLES ON REQUEST

JAVELOT

SOURIAU
AVIATION

CATALOGUES SUR DEMANDE

PLUGS AND SOCKETS to FRENCH BRITISH AMERICAN STANDARDS
Catalogues on request

SOURIAU & Cie
SOCIÉTÉ ANONYME AU CAPITAL DE 100.000.000 DE FRANCS
9 à 13, RUE DU GÉNÉRAL GALLIÉNI
BILLANCOURT (SEINE)
TÉL. : MOLitor 67-20

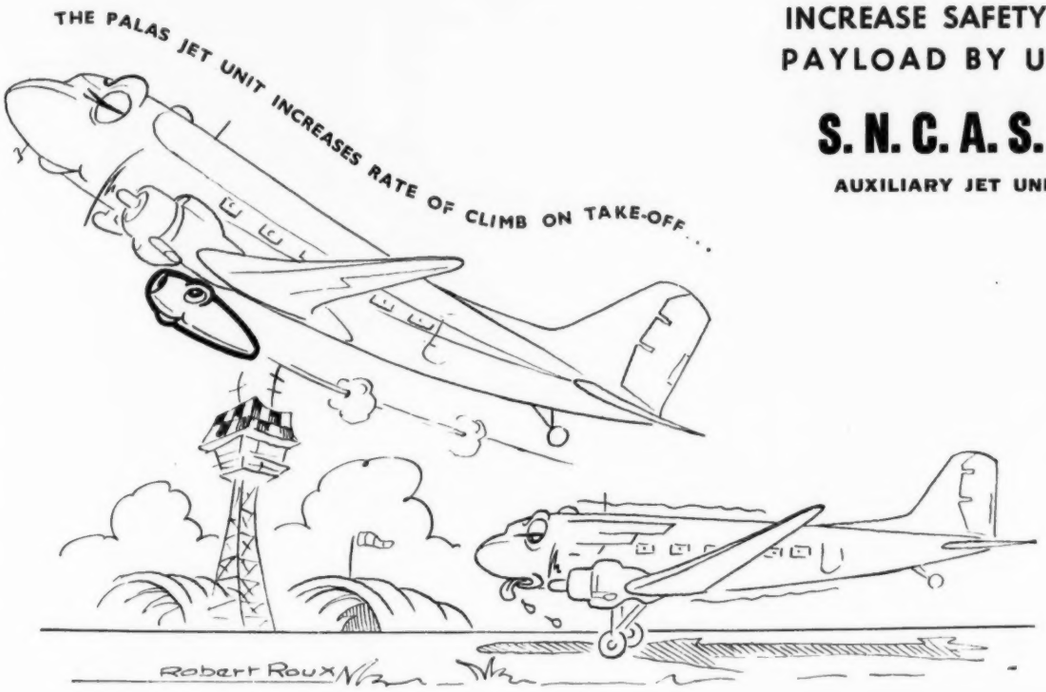
POTEZ 75

GROUND SUPPORT AIRCRAFT

WITH 450 H. P. POTEZ 8 D ENGINE

SOCIÉTÉ DES AVIONS ET MOTEURS HENRY POTEZ

Kléber 27-83 — 46, avenue Kléber, PARIS XVIe — POTEZAERO-PARIS



INCREASE SAFETY AND
PAYLOAD BY USING

S. N. C. A. S. O.

AUXILIARY JET UNITS

SOCIÉTÉ NATIONALE DE CONSTRUCTIONS AÉRONAUTIQUES DU SUD-OUEST 105, Av. Raymond-Poincaré, Paris-16e Tél. KLÉ. 32-20

S. A. des Ateliers d'aviation Louis BREGUET – 24, rue Georges Bizet, PARIS 16e – Tel. Passy 9093

New service
ROME - MILAN - PARIS - LONDON

"L'Europeo"

WITH THE
SUPER **CONVAIR**
ALITALIA **340**

TOURIST RATES :
ROME-PARIS : **31,400 lire single, 48,130 lire return**
ROME-LONDON : **43,500 lire single, 78,300 lire return**
MILAN-PARIS : **19,700 lire single, 35,460 lire return**
MILAN-LONDON : **31,900 lire single, 57,420 lire return**

Information and reservations from **your own travel agency or any Alitalia office :**
Rome (passengers) : Via L. Bissolati 15 - Tel. 470.242 - Telegrams : Alipass
(freight) : Piazza Augusto Imperatore 39 - Tel. 61.975 - Telegrams : Alimerci
Milan (passengers and freight) : Via G. Verdi 6 - Tel. 802.626 - Telegr. : Alipass

IBERIA

AVIACO

AVIACIÓN Y COMERCIO, S. A.

AIR SERVICES

MEMBER OF I. A. T. A.

Central Office :
ADUANA, 33 - MADRID - SPAIN

153435

BOUGIES
RAMPES
MAGNÉTOS
VIBREURS
ALLUMAGE DE RÉACTEURS

ABG

DÉPARTEMENT AVIATION - 3, IMPASSE THORETON - PARIS-XV^e^
TÉL. VAU. 68-40

NEW PRICES
for Germany :

Annual Subscription	DM **27.50** (formerly DM 28.—)
Six months Subscription	DM **14.50**
Single Copy	DM **2.75** (formerly DM 3.—)

Our subscribers, readers and agents are asked to take note of the new prices.

INTERAVIA

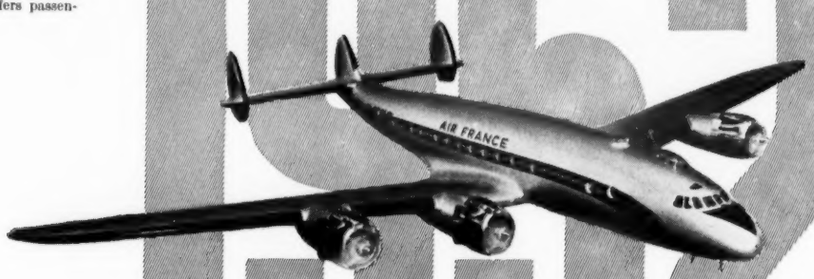
Photo credits :

Front cover : Factory photo ; pp. 565-568 : Hamilton Wright, New York (1), T.C.A. (1), Panagra (1), P.A.A. (1), B.E.A. (1), Interavia records (1) ; pp. 568-570 : D. E. Dolan, Montreal (1), I.A.T.A. (1), B.O.A.C. (1) ; pp. 575-577 : T.C.A. (14), Arnott & Rogers, Montreal (1) ; pp. 578-579 : Canadian Pacific Railways (5), Artray, Vancouver (1), factory photos (3) ; pp. 580-581 : Interavia records ; pp. 582-583 : A.T.P. (3), Wassermann (2), Zurich Cantonal Building Directorate (4), Interavia records (12) ; p. 585 : factory photo ; pp. 586-587 : factory photos ; pp. 588-589 : Interavia ; p. 591 : factory photos ; pp. 592-593 : Service Information « Air », photo No. 14-4083 (1), French Defence Ministry (1), factory photos (5) ; pp. 595-601 : factory photos (14), Interavia (17) ; pp. 602-604 : author.

Printed in Switzerland

With each succeeding year Air France is consolidating its position on the world market through its constantly expanding route network, its high standard of maintenance, the comfort and service it offers passengers.

1952



A constructive year, as the following facts show

The opening of several new routes brought Air France's network up to 250,000 kilometres.

APRIL :	Opening of the Paris-Mexico City service.
NOVEMBER :	Paris-Tokyo in 37 hours 30 minutes flying time by "Constellation".
DECEMBER :	Installation of sky lounge chairs on one of the Paris-Casablanca services. New luxury service to Dakar.
JANUARY 1953 :	Air France opened the Paris-Caracas-Bogota service.

Air France is doing its utmost to bring the aircraft within reach of all :

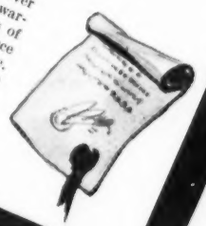
— *" tourist class " has been introduced on some routes.*
— *major reductions have been agreed to on others.*

Air France is constantly improving and modernizing its fleet. During 1952, the famous Lockheed "Constellation", nicknamed the "Atlantic favourite", came into general use on the principal routes.

"Super Constellations", Vickers "Viscounts", de Havilland "Comets" and Bréguet "Deux-Ponts" have been ordered and will be put into service in 1953.

IN BOTH TECHNICAL AND COMMERCIAL FIELDS, AIR FRANCE "QUALITY" IS KNOWN THROUGHOUT THE WORLD

On July 8th, 1952, Mr. Neeland, a representative of the U.S. Civil Aeronautics Administration handed over to Air France the certificate awarded by C.A.A. to the workshops of the Overhaul Centre and Maintenance Service at Orly Operational Centre. A similar certificate was awarded to the Courbevoie engine overhaul centre in October 1951. Air France is one of the few companies to hold this Civil Aeronautics Administration certificate.



Air France has a powerful organization at your service.
Why not make it your first choice among airlines?

AIR FRANCE

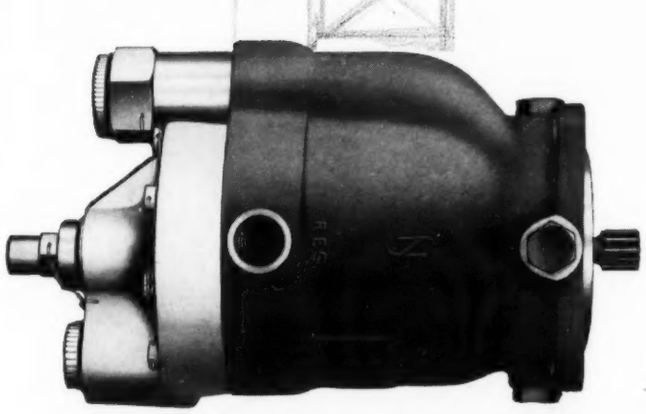
All travel agencies and Air France — Paris : 119, Champs-Elysées, Balzac 70-50 ; 2, Rue Scribe, Opéra 41-00 ; 30, Rue du Faubourg Poissonnière, Taitbout 46-00, 52-02, 53-00 — Bordeaux : 12, Cours du 30 Juillet, Tel. 66-51 — Lyons : 10 bis, quai Jules-Gourmont, Tel. Gailleton 57-01 — Marseilles : 62, La Canebière, Tel. National 38-63 — Nantes : Palais de la Bourse, Tel. 342-52 — Nice : 7, Avenue Gustave V, Tel. 879-51 — Strasbourg : 22, Rue du Vieux-Marché-aux-Vins, Tel. 212-74 — Toulouse : 2, Boulevard de Strasbourg, Tel. Ma 84-04.

F 5525 K

from White Sands, N.M. to * * *
guided by–

STRATOPOWER
HYDRAULIC PUMPS

High on the list of vital components to home your guided missile to its destination are the STRATOPOWER Hydraulic Pumps. These "muscles" provide the power for guidance, scanning, tracking and control. STRATOPOWER Hydraulic Pumps are used more and more on Rockets, Guided Missiles and Launchers because they pack dependability, performance and power into a minimum of space. Apply these precise conveyors of power to your designs. The experience of years in the aircraft field is back of every STRATOPOWER Pump.



66 W STRATOPOWER Pump, variable delivery, 3 to 10 gpm capacities, 3000 psi at 1500 rpm. Other STRATOPOWER Pumps in constant and variable delivery types. Capacities .25 to 10 gpm provide pressures to 3000 psi.

Write for full information today

WATERTOWN DIVISION
THE NEW YORK AIR BRAKE COMPANY
STARBUCK AVENUE • WATERTOWN • N. Y.

THE NEW YORK AIR BRAKE COMPANY
710 Starbuck Avenue
Watertown, N.Y., U.S.A.

Please send me full particulars on your
STRATOPOWER Hydraulic Pumps

Name _____

Company _____

Address _____

City _____ Zone _____ State _____